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RESIDUAL WASTE MANAGEMENT RESEARCH AND PLANNING PROJECTS

U.S. Environmental Protection Agency
Water Planning Division
Washington, D.C. 20460

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This Residual Waste Management Research and Planning Projects Handbook contains selected abstracts of projects that are underway or have been completed, and publications that are available on the subject of residual wastes and their impact on ground and surface waters.

The abstracts are arranged by types of residual waste, i.e., sludge, liquids, and solids. The types are further categorized into the various kinds, i.e., commercial wastes, municipal wastes, industrial wastes, mining wastes, etc. The abstracts are cross-referenced where necessary.

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RESIDUAL WASTE MANAGEMENT RESEARCH AND PLANNING PROJECTS

FEBRUARY 1977

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 6 1977

SUBJECT: Transmittal of Document Entitled "Residual Waste Management Research and Planning Projects"

Walter Groszyk

FROM : for Edmund Notzon, Acting Director
Water Planning Division

TO : All Regional Water Division Directors
ATTN: Regional 208 and Nonpoint Source Coordinators

TECHNICAL GUIDANCE MEMORANDUM: TECH-34

Purpose

This memorandum transmits to you the recently prepared residuals management research and planning project control guidance document.

Guidance

This document is designed to provide State and areawide 208 agencies, municipal and State planners, and interested parties in the private sector with information on the existence, status, and availability of projects and publications that relate to subsection (J) and (K) of Section 208, namely, "(J) a process to control the disposition of all residual waste generated in such area which could affect water quality."

Enclosure

FOREWARD

Section 208 (P.L. 92-500, The Federal Water Pollution Control Act, Amendments of 1972) sets forth a comprehensive program that has been established to solve water pollution problems in an environmentally acceptable manner. The purpose of this handbook is to provide information on the existence, status, and availability of projects and publications that relate to subsections (J) and (K) of Section 208, namely; "(J) a process to control the disposition of all residual waste generated in such area which could affect water quality; and (K) a process to control the disposal of pollutants on land or in subsurface excavations within such area to protect ground and surface water quality".

The information in this handbook has been specially selected to provide planners with technical, legal, institutional, social, economic and environmental information to assist in the establishment of residual waste management pursuant to Section 208.

SUMMARY

This Residual Waste Management Research and Planning Projects Handbook contains selected abstracts of projects that are underway or have been completed, and publications that are available on the subject of residual wastes and their impact on ground and surface waters.

The abstracts are arranged by types of residual waste, i.e., sludge, liquids, and solids. The types are further categorized into the various kinds, i.e., commercial wastes, municipal wastes, industrial wastes, mining wastes, etc. The abstracts are cross-referenced where necessary.

The abstracts provide project or publication identification, a brief summary, the status of the project, point of contact and/or source of information, and acquisition details.

This handbook is designed to provide timely information for the 208 planning program. It is oriented for an audience who may have diverse backgrounds in technical and management skills. These individuals will generally be municipal and State planners, engineers, and technical consultants.

HOW TO ORDER

(DO NOT ORDER FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY)

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USER'S GUIDE

This Handbook is divided into seven sections: (1) residual waste disposal; (2) residual waste reclamation; (3) evaluation of alternatives; (4) environmental impact; (5) socio-economic and intergovernmental aspects; (6) models; and (7) planning and management. Sections one through five are further divided into parts to facilitate pinpointing specific subjects of interest within each section. For example, the section of residual waste disposal is divided into three parts: sludge disposal, solids disposal, and liquids disposal. Furthermore, each part is divided into specific categories, e.g., agricultural wastes, mining wastes, municipal wastes, industrial wastes, commercial wastes, etc.

Abstracts that relate to more than one category of residual waste have been cross-referenced under their appropriate headings. The entire abstract has been reprinted to eliminate the chore of searching back and forth through the handbook for the cross-referenced material.

Information provided in the abstracts include the following:

(1) Project Title	In most cases this is the actual title of the publication. For those projects not published, the title is only a description in most cases.
(2) Abstract/Summary	Where publications are available, the information is an abstract of that publication. For ongoing projects, the abstract/summary identifies the project, and where possible, states findings and/or expectations, and the present status of the projects.
(3) Status	This gives the estimated date of completion of the project, a progress report, where possible, the availability of publications, the costs and acquisition source.
(4) Information/Contact	This lists persons responsible for distributing information about the projects or publications and where they may be obtained.

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PART I - SLUDGE DISPOSAL

I. SLUDGE DISPOSAL

A. WATER TREATMENT SLUDGES

PROJECT/TITLE

Reuse of Solid Waste From Water-Softening Processes

CITATION

Nelson, Raynor D.; Vey, Eben IIT Research Institute, Chicago, Ill.
Final Report

ABSTRACT/SUMMARY

The report summarizes a study of several methods for dewatering a water-softening sludge. Beneficial uses of the dewatered sludge are evaluated. Vacuum filtration after gravity thickening was found to be more economical for the area studied, the Village of Park Forest, Illinois, than centrifuging, lagooning or sand bed drying. The study found that in a dry powder or almost dry condition, the sludge has a potential use as a mineral filler in paints, floor coverings, caulking, and bituminous products, and as a soil admixture and/or soil conditioner.

STATUS

Publication is available from NTIS PB- 224820
$4.25/MF $1.45

INFORMATION CONTACT

N/A

PROJECT/TITLE

Disposal of Waterworks Sludges at Sewage Treatment Plants

ABSTRACT/SUMMARY

The objectives of this project were to determine by a pilot plant study, the effects that doses of waterworks sludge has on activated sludge.

Several doses of waterworks sludge were added to the activated sludge process, and the phosphate removing ability of the waterworks sludge was determined by sampling sewage outlets. The effects of the addition of waterworks sludge on the efficiency of operation was determined in terms of COD, and SS removals and turbidity of the final effluent.

Sludge from a waterwork was fed to a small 200 gal per day power plant with very little adverse effects on the sewage treatment plant with the exception of the increased amount of sludge.

The report has limited application in that there are only a few cities that have combined water and sewage plants. The tests were done in Philadelphia, Milwaukee and other cities where this combination is present.

STATUS

The project was completed in 1972. Publication Data:
American Waterworks Journal 6/73

INFORMATION CONTACT

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PROJECT/TITLE

Land Treatment of Wastewater

CITATION

N/A

ABSTRACT/SUMMARY

To develop cost effective techniques for management of wastewater from military facilities using land treatment and for predicting evaluating, and controlling the effects of these wastes on environmental quality.

Three levels of activity will be included in this project- (A) controlled experiments at the USACRREL Prototype Facility to develop criteria and identify basic responses, (B) research monitoring of operational land treatment systems such as the one to be constructed at Ft. George G. Meade, Md., (C) evaluation of longer term environmental responses at existing military facilities which are using the land as a receiving media for wastewater.

Supporting agency address information: OCE Cold Regions Research and Engineering Laboratory, P.O. Box 282 Hanover NH 02755

STATUS

N/A

INFORMATION/CONTACT

H.L. Mckim
I. Iskandor
U.S. Army
Cold Reg. Res. & Engin. Lab.
P.O. Box 282
Hanover, New Hampshire 03755

PROJECT/TITLE

Pyrolysis as a Means of Sludge Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The study involves pyrolysis of digested and undigested sludge with municipal refuse for energy recovery as well as disposal of waste materials. This involves process optimization and economic feasibility of pyrolysis with reference to environmental compatability, organic volume reduction, by-product recovery, and net energy production. Emphasis is placed on parameters such as maximum gasification and optimization of water-gas reaction.

STATUS

N/A

INFORMATION/CONTACT

Ky Chen - Civil Engineer
F. R. Bowerman
University of Southern California
School of Engineering
3551 University Ave.
Los Angeles, California 90007
213-746-2941

PROJECT/TITLE

Economics of Solid Waste and Sludge Management and Environmental Quality in Rural Areas

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine legal and institutional guidelines and regulations for handling, disposing, and recycling solid waste and sludge. Evaluate citizens' attitudes towards the disposal and recycling of solid waste and sludge in rural areas. Determine type and quality of services offered, pricing and financing arrangements, and cost of alternative solid waste management systems for communities of different size and industry mix. Evaluate the costs and benefits of alternative methods of sludge disposal or recycling by size of community served.

APPROACH: Surveys will be used to determine citizens' attitudes towards the disposal and recycling of solid waste and sludge in rural areas. Data on types and costs of solid waste collection, transportation, storage, and disposal systems for rural communities will be obtained by surveys and analyzed using comparative cost and input-output analyses. Alternative sludge management systems will be evaluated using comparative cost analysis. Principal component analysis will be used to examine the socioeconomic data associated with the location of waste disposal and utilization sites in rural areas.

STATUS

Information on the cost of solid waste collection and landfill operation was obtained in a survey of counties in the Southeast. A statewide study of public perceptions of natural resource problems was completed. Preliminary results from a survey of a 9-county area in north central Missouri indicated that a majority of the sample supported population growth, industrial development, and social improvement, although problems associated with uncontrolled growth were recognized. Problems with the quality of the natural environment were less serious than other community problems. Legal research needs relating to solid waste and sludge management involve an examination of administrative codes, standards, guidelines and design criteria to determine their impact on pollution control, their adequacy in preventing surface water pollution and monitoring and sampling requirements. Project staff participated in a national conference on recycling municipal sludges and effluent. The purpose of the conference was to identify research needs for successful utilization of soils as a treatment system.

INFORMATION/CONTACT

D. Massey
University of Wisconsin
Agric. Experiment Station
116 Agriculture Hall
Madison, Wisconsin
(608) 262-1234

PROJECT/TITLE

Wastewater Solids Utilization on the Land

CITATION

N/A

ABSTRACT/SUMMARY

The Authority's engineers and Rutgers University have investigated and believe that recycling the solids to the land would be beneficial from the standpoint of reclaiming barren land by building up the organic content of the soil, supplying much-needed nutrients for vegetated areas, and increasing the moisture-retaining capabilities of leached-out sandy soils.

The purpose of the pilot project is to demonstrate how a high-quality soil and vegetation can be developed by utilizing digested wastewater solids. Physical, chemical and bacteriological testing of the ground water and vegetation will be performed on a regular basis. Studies will be conducted to determine distribution methods, optimum solids loading rates and the effects of weather and atmospheric conditions.

STATUS

N/A

INFORMATION/CONTACT

L. Simpson
Ocean County Sewage Authority
Toms River, New Jersey 08753

B. Domestic Wastewater/Sewage

PROJECT/TITLE

Sludge Processing, Transportation, and Disposal/Resource Recovery; Planning Perspective

CITATION

N/A

ABSTRACT/SUMMARY

A methodology was developed in this report for use in the 208 planning process for the evaluation of alternatives for the ultimate disposal of residual wastes generated in municipal wastewater treatment plants. This methodology considered technical, economic, social, and institutional factors pertinent to a thorough review of alternatives.

Residual wastes generated in municipal wastewater treatment plants were characterized. Handling and treatment processes for the residual wastes were discussed and evaluated in light of qualitative and quantitative changes to the residual wastes. Liquid, gaseous, and solid sidestreams produced in residual waste treatment were evaluated and rail, pipeline, barge, and truck transport of residual wastes were analyzed.

Environmental, operational, and institutional constraints to the use of ocean disposal, lagoons, sanitary landfills, sludge recycling, and land reclamation were presented.

STATUS

Completed EPA 440/9-76-002 NTIS #PB251013/AS

INFORMATION CONTACT

Dr. Dean Neptune
Office of Pesticides Programs
401 M St. S.W.
Washington, D.C. 20460
(202) 426-2535

PROJECT/TITLE

System Alternatives in Oxygen Activated Sludge

CITATION

N/A

ABSTRACT/SUMMARY

An oxygen activated sludge system with co-current contacting of oxygen and mixed liquor in a plug flow reactor was operated on District of Columbia primary effluent during a two-year period over a wide range of loading (F. M. 0.26 to 2.0) with Solids Retention Times (SRT) from 2.0 to 13.0 days at the EPA-DC Pilot Plant.

STATUS

N/A

INFORMATION CONTACT

D. F. Bishop
Environmental Protection Agency
(513) 684-8353

PROJECT/TITLE

Sewage Disposal On Forest and Associated Lands

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is to determine methods for disposal and utilization of sewage effluent and sludge on forest lands without pollution of ground and surface waters, determine the soil physical and chemical characteristics necessary for proper sewage effluent and sludge disposal and renovation on forest lands, and determine the effects of sewage effluent and sludge applications on native and exotic forest vegetation.

Municipal and industrial sewage effluents were applied to a comprehensive range of solids and forest vegetation at field locations in conjunction with municipal land disposal projects. Soil and ground water samples were analyzed for nutrient elements and for potentially toxic materials: Changes in composition in native plant communities and the growth of native and exotic plants were studied following application of chlorinated secondary sewage effluent, wastewater from sewage lagoons, and stabilized sewage sludge to forest lands.

STATUS

The project is a continuing one. Considerable data has been collected that shows that nitrogen is the major pollutant. Reports may be obtained upon request.

INFORMATION/CONTACT

Stephen Nesbitt
North Central Forest Extension Service
Harrison Road
East Lansing, Michigan
(616) 775-7776
(517) 355-7740

PROJECT/TITLE

Combined Sludge Processing Project

CITATION

N/A

ABSTRACT/SUMMARY

CCCSD has built an Advanced Treatment Test Facility (TTF) to treat raw sewage with lime followed by biological nitrification and denitrification at up to 2.5 MGD. The excess lime sludge is dewatered in a pair of centrifuges operated in series to separate calcium carbonate from calcium phosphate organic matter and inerts. Calcium carbonate is to be converted to recovered lime in one set of multiple heat furnaces and the residual sludge will be incinerated in another set of furnaces. This proposal documents the studies already carried out leading to the above conclusions and fills in engineering and analytical data necessary to make a complete report.

STATUS

Publication: Sludge Processing For Combined Physical-Chemical-Biological Sludges
GPO-EP 1.23/2:R2-73-250 $2.10
NTIS/PB 223 341

INFORMATION CONTACT

P. H. Caldwell
Central Contra Costa Sanitation District
Walnut Creek, California 93003

PROJECT/TITLE

Lime Stablized Sludge: Its Stability and Effect on Agricultural Land

CITATION

N/A

ABSTRACT/SUMMARY

An optimum system for the lime stabilization of municipal sewage sludge was first developed and evaluated. The primary objects of this work were (1) to determine the degree of stability induced in a sludge by lime addition and (2) to determine the effects of spreading lime-stabilizedsludge on agricultural land. Lime doses and contact times required to eliminate the pathogenic bacteria and odors from raw sludge were determined by laboratory studies,and the information obtained was translated into design and operational parameters for a pilot scale, continuous flow process. Physical, chemical and biological characteristics of both the raw and stabilized sludge, were measured. Soil and crop studies, both in a greenhouse and on controlled outdoor plots, were performed to determine the effects of spreading lime-stabilized sludge. Effective lime stabilization of sludge was accomplished by elevating the pH to 12.0 with lime addition and maintaining the pH level for at least 30 minutes.

STATUS

Completed EPA 670/2-75-012

INFORMATION CONTACT

J. E. Smith, Jr.
Environmental Protection Agency
(513) 684-8267
Cinn., Ohio 45213

PROJECT/TITLE

Using Cropland For Sewage Wastewater And Sludge Disposal W. E. Sopper

CITATION

N/A

ABSTRACT/SUMMARY

The objective was to determine the interaction of soils and plants with sewage wastewater and sludge disposed on cropland and forestland, with emphasis on P, boron, and N reactions in the soil and with the biosphere and on the soil's potential for removing N from wastes by denitrification; develop systems for land disposal of wastewater and sludge.

Hydrologic effects such as perched water tables, interflow and runoff were measured.

STATUS

Completed Publication: Conference on Recycling Treated Wastewater
Through Forest and Cropland
GPO-EPI.23/2:660/2-74-003 $1.20
NTIS-PB 236313/AS

INFORMATION CONTACT

N/A

PROJECT/TITLE

Review of Experience With Landspreading Liquid Sewage Sludge - A Bibliography

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this program was to provide a critical review of existing information and operational experiences in landspreading of liquid sewage sludge. Major emphasis was given to obtaining information concerning unreported landspreading operations currently employed in this country through a telephone survey and visits to representative treatment plants and associated landspreading operations. This information was evaluated with respect to present technology, and environmental impacts from landspreading including evaluation of landspreading subsystems relating to sludge handling and conditioning modes of transport, spreading techniques, and soil and/or crop responses. Further this program also provided a summarization and an updating of sewage sludge landspreading practices found in the literature. An evaluation of the data obtained will identify deficiencies where additional studies are needed and aid in the development of proper design criteria for landspreading systems.

The investigator found that only 3 or 4 sewage treatment plants had a water quality program. There is a lack of intensive monitoring of waste programs, though there is an abundance of field work being done.

Research revealed that approximately 400 plants in the five most populous regions in the U.S. have been landspreading sewage sludge without monitoring for over 50 years.

The completed bibliography contains short histories with annotated bibliographies of 25 treatment plants visited by the researchers.

STATUS

Publication Pending

INFORMATION CONTACT:

G. K. Dotson
Office of Research Monitoring
NERC
Cincinnati, Ohio 45213

PROJECT/TITLE

West Shade River Abatement Demonstration Project

CITATION

N/A

ABSTRACT/SUMMARY

The concepts of sand abatement, strip-mine reclamation and mine-acid control are the objectives of the project. The demonstration project will seek to show how the use of sludge, fertilizing, liming and other minor techniques will permit the growth and self-regeneration of various grasses, shrubs and trees.

The demonstration project is being conducted in Meigs County, Ohio which is a part of Appalachia. Severe erosion problems occurring in certain strip-mine areas can be eliminated or controlled utilizing methods and materials which have been researched. Sand erosion from high walls and spoil banks causes considerable property loss due to the deposition of sand over once-tillable soils and the clogging of existing waterways.

One of the problems encountered in this project is the distance from which the sludge had to be transported. The transportation of sludge from the waste treatment facility to the Appalachian hills is expensive.

STATUS

N/A

INFORMATION/CONTACT

Appalachian Regional Commission
C. Meir
State Department of Natural Resources
Columbus, Ohio 43212
(614) 466-3066

Gary School
(614) 466-6294

PROJECT/TITLE

The Role of Sewage Effluent and Sludge in the Introduction of Mercury Into Marine and Agricultural Ecosystems

CITATION

N/A

ABSTRACT/SUMMARY

The proposed work will (1) determine the significance of mercury input into the estuarine environment by effluent and sludge disposal, (2) determine and explain the variations in mercury concentration observed in sewage treatment plants, (3) determine the input of mercury to the marine system by rain and runoff, (4) continue studies on the distribution of mercury in the local (Cateret County, North Carolina) estuaries comparing a system receiving effluent (Calico Creek, Morehead City, North Carolina) with a variety of less affected areas, (5) determine the rate of mercury accumulation in marine organisms which are fed on sewage sludge, (6) determine the rate of uptake of mercury by vegetables which are grown in soil enriched with sewage sludge. Coldvapor atomic absorption analysis of mercury will be used.

STATUS

The project is partially finished, and the investigators state that they have a pretty clear picture of the impact of mercury in the estuarine environment. Studies are being conducted at a small town Moorehead City treatment plant (15,000 pop.). Study has shown a very distinct pattern of mercury distribution in estuaries and animals. The distribution of mercury is very restricted in distance. It remains very close to the outfall of the sewage treatment plants.

A town of comparable size and adjacent to Moorehead has one half to one third less mercury in its effluent and sludge. There are no industrial sources in either town. It is presently theorized that the mercury contamination may have come from the use of house paints containing mercury. Fungi are a problem in the area and mercury was used as an inhibitor at one time. The contamination may be resulting from storm water runoff.

Final Draft will be printed in November 1976.

INFORMATION/CONTACT

Dr. R. T. Barger
Duke University
Marine Lab.
Beaufort, N. Carolina 28516 (919) 728-2111

PROJECT/TITLE

Feasibility of Using Forest Land for Sludge Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This project is investigating the feasibility of using forest ecosystems to absorb nutrient additions in the form of sewage sludge. This research is important to the current problem of water pollution caused by nutrients leaching from sludge disposed of either by dumping at landfill sites or by other means that do not incorporate recycling or nutrient removal.

STATUS

Sludge from a nearby municipality and from recreation complexes in the White Mountain National Forest was landspread in June, 1975. Preliminary studies have been completed, but impact (environmental) work has just started. The project is scheduled to be completed by next summer (1976).

INFORMATION/CONTACT

J. M. Hornbeck
University of New Hampshire Graduate School
Durham, New Hampshire 03824
(603) 868-5576, 9697
(604) 726-8902

PROJECT/TITLE

Demonstration of Non-Aqueous Sewage Disposal System for Recreational and Remote Areas

CITATION

N/A

ABSTRACT/SUMMARY

The overall objective was to demonstrate the feasibility and effectiveness of using a compact, closed-loop, non-aqueous system for collecting, transporting and disposing of domestic waste at remote and recreational areas where conventional methods of disposal are undesirable because of needs to protect recreational and underground waters and in areas where water is in short supply. It will be demonstrated that water conservation is achieved since a non-aqueous flush media will be utilized. The system was demonstrated and evaluated during both winter and summer seasons at a facility serving the recreational and tourist industry. The physical, biological, pathological, chemical and aesthetic characteristics of the flush media was demonstrated. Specific technical data determined and evaluated included: 1) Data on the useful life of the flush media, 2) Per capita waste loading to establish future design criteria, 3) Effectiveness of the incineration process, 4) Operational maintenance and reliability data to project optimum operational techniques and procedures.

STATUS

Completed EPA 670/2-73-088

INFORMATION CONTACT

N/A

PROJECT/TITLE

Fly Ash Filter Aid for Sewage Solids Dewatering and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project demonstrated the use of fly ash from a nearby power plant and sludge incinerator ash as filter aids in the pressure filtration of sludges. Pilot plant tests indicated that due to the nature of the sludge from the trickling filter plant other alternate methods of pretreatment would incur severe economic penalties. On the other hand the chemical ingredients in the fly ash and sludge incinerator ash, which are obtained at no cost, permitted adequate dewatering at minimum cost. In addition, the trace minerals in the ashes and the plant food value from the sludge constituted a useable soil conditioner. The City of Cedar Rapids plans to utilize some of this sludge as a soil conditioner and fertilizer in their parks.

STATUS

Project Completed Publication
GPO-EP1.23/2:R 2-73-231 $2.10
NTIS-PB 223-535

INFORMATION CONTACT

N/A

PROJECT/TITLE

Effective Utilization of Municipal and Utility Sludges and Ashes

CITATION

N/A

ABSTRACT/SUMMARY

The object of the project was to: 1) Perform a comprehensive literature review and survey of the present municipal and utility sludge and ash production, disposal methods and utilization methods. 2) Determine technical feasibility and economic practicality of more widespread application of present utilization methods. 3) Suggest new utilization methods with consideration of technical feasibility and economic practicality. A search of the literature and contact with a variety of governmental and trade organizations who are producers and/or present or potential users of sludges and ashes were conducted.

STATUS

Completed Publication is pending.
Characterization and Utilization of Municipal and Utility Sludges and Ashes.
Vol. 1
EPA #670/2-75-033 a, b, c, & d

INFORMATION CONTACT

N/A

PROJECT/TITLE

Sewage and Refuse As Energy Sources

CITATION

N/A

ABSTRACT/SUMMARY

DESCRIPTION: Numerous problems are focusing on the handling and treatment of sewage, garbage, cotton gin trash and food processing plant wastes. The organic materials in these residues are important sources of energy which are not being utilized, but are costing substantial amounts of money for disposal. This work incorporates the use of enzyme and microbial generators which will be employed to convert cellulose, hemicellulose, and lignin into simple soluble substances (primarily sugars) which can be harvested or further converted into ethyl alcohol and/or methane. Enzyme generators are to be developed and utilized instead of living cells for certain degradative processes to insure rapid conversion of large amounts of refuse. Development of a continuous fermentative system is described. Gasoline-ethyl alcohol mixtures with appropriate additives and engine settings will be tested in internal combustion engines to determine the feasibility of using mixtures to expand the present fuel supply.

STATUS

N/A

INFORMATION/CONTACT

E. E. Staffeldt Biology
New Mexico State University
School of Arts & Sciences
University Park
Las Cruces, New Mexico 88001

PROJECT/TITLE

Sewage Disposal On Forest And Associated Lands

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine methods for disposal and utilization of sewage effluent and sludge on forest lands without pollution of ground and surface waters, determine soil physical and chemical characteristics necessary for proper sewage effluent and sludge disposal and renovation on forest lands. Determine the effects of sewage effluent and sludge applications on native and exotic forest vegetation, and determine the movement and hydrologic effects of stream sediments.

APPROACH: Municipal and industrial sewage effluents will be applied to a comprehensive range ofsoils and forest vegetation at field locations in conjunction with municipal land disposal projects. Soil and ground water samples will be analyzed for nutrient elements and for potentially toxic materials. Sludge tests will be conducted on acid coal-mine spoil banks and on impoverished forest soils where ground and surface water quality effects will be tested. Accumulation of the nutrients and toxic elements in soils and plant materials will be determined. Changes in composition in native plant communities and growth of native and exotic plants will be studied following application of chlorinated secondary sewage effluent, waste water from sewage lagoons, and stabilized sewage sludge to forest lands. Three studies of stream sediment movements, covered by written agreements with fisheries research groups, will be completed.

STATUS

Pond stabilized waste water applied at various rates to hardwood and conifer plantings over two growing seasons has shown soil water at 24-inch depths at 96 percent phosphorus and 80-90 percent nitrogen renovation. Red pine (Pinus resinosa) poles have shown increased needle length but potentially toxic levels of boron are being measured in foliage. Irrigation of hardwood tree cuttings and seedlings improves survival and height growth. Soil incorporation of sanitary wastes has resulted in elevated nitrogen levels in ground water at 6-8 foot depths. No bacterial contamination has been detected under normal rainfall. Leaching chamber results indicate that incorporating sludge in the surface 6 inches of 4-foot soil columns of acid mine spoil at rates up to 300 dry tons/acre have reduced Al, S, and H ions in drainage waters.

INFORMATION/CONTACT

D. H. Urie
Michigan State University
U.S.D.A. N. Cen. For. Ex. Sta.
New Administration Bldg.
East Lansing, Michigan 48823

PROJECT/TITLE

Co-Incineration of Sewage Sludge with Refuse and/or Coal

CITATION

N/A

ABSTRACT/SUMMARY

Purpose of the project is to evaluate the operational worth and environmental aspects, if any, of adding combustible solid matter to wastewater plant sludges and filter cakes, as off-sets to part or all of the fuels conventionally used in sludge incineration practice. Impending shortages of natural gas and fuel oil create the sense of urgency in this work. Low-sulfur coal and combustible solid wastes will be utilized as admix materials in various test sequences. Wastes to be tried include shredded combustibles from refuse, in pelletized and loose form, wood chips from urban tree-trimming, shredded tires, and industrial combustible wastes. A full-scale multiple hearth furnace in a modern wastewater treatment plant will be used. Applicability to other incinerators of the 200-plus total in United States' communities will be assessed. Assay of stack gases, after scrubbing, will include relevant chemical properties of public health significance. Scrubber drainage and ash will also be assayed.

STATUS

N/A

INFORMATION/CONTACT

D. C. Bergstedt
W. A. Blain
G. J. Swanson
R. L. Hughes
Metrop. Waste Control Comm.
350 Metro Sq. Bldg.
St. Paul, Minnesota 55101

PROJECT/TITLE

Pyrolysis of Sewage Sludge and Solid Municipal Waste Mixtures

CITATION

N/A

ABSTRACT/SUMMARY

Determination of whether pyrolysis of sludges, either raw or activated, or in mixtures with municipal wastes could provide feasible alternatives to present disposal practices.

STATUS

N/A

INFORMATION/CONTACT

U.S. Dept. of the Interior
Bureau of Mines
Pittsburgh, Pennsylvania 15213

C. Industrial Sludges

PROJECT/TITLE

Reclamation of Metal Values from Metal Finishing Waste Treatment Sludges

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project was to develop information on sludge volumes and characteristics produced in metal finishing plants, determine the effects of weathering on sludges in current disposal practice, and carry out bench scale investigations on potentially attractive techniques for recovering metals from these sludges. On the basis of the investigation, the process design and economics will be determined for selected metal recovery systems.

STATUS

Completed EPA Report #670/2-75-018

INFORMATION/CONTACT

Ray Smithson
Battelle Memorial Institute
Columbus, Ohio
424-6424
    7814

PROJECT/TITLE

Hardening and Disposal of SO_2 Scrubbing Sludges

CITATION

N/A

ABSTRACT/SUMMARY

This project involves the development of chemicals, methods, and systems for hardening and disposal of fly ash sludges (C_aSO_3 and (C_aSO_4) resulting from the wet scrubbing of coal fired power boilers with various alkali slurries.

A collection of papers entitled "Flue Gas Desulfurization and Sludge Stabilization" is available through the Library of Congress Catalogue #75-14865. (Dravo Lime Company). This work contains indirect reference to the impact of sludge on water pollution.

Presently, three systems have been designed and tested. They are highly dependent on conditions (i.e. terrain, space, etc.) and are highly flexible for adaptability. The project is a continuing one.

STATUS

Other Symposium Papers are Available Upon Request.

INFORMATION/CONTACT

J. Selmeczi
Dravo Corporation
#1 Oliver Plaza
Pittsburgh, Pa. 15222

PROJECT/TITLE

A Color Removal and Fibrous Sludge Disposal Process for the Kraft Paper Industry

CITATION

N/A

ABSTRACT/SUMMARY

This publication discusses the development of an economical design and operational data applicable to the Kraft pulp and paper industry in removal of color in mill effluents and in disposal of fibrous sludges. Color removal was accomplished by lime precipitation of the color bodies and fibers with subsequent regeneration of the lime by sludge combustion in a kiln.

STATUS

Project completed. Publication: GPO-#P1.23.2:660/2-74-008 $1.65
NTIS-PB 235573/AS

INFORMATION CONTACT

N/A

PROJECT/TITLE

Solid Waste Disposal

CITATION

Final rept. Phillips, Nacy P.; Wells, R. Murray, Radian Corp., Austin, Tex.

ABSTRACT/SUMMARY

The purpose of the present investigation is to identify available technologies developed in other industries that may be applicable to lime/limestone scrubber sludge disposal. Much of the technology already developed for phosphate slimes, by-product gypsum, taconite tailings, coal ash, and acid mine drainage sludge is applicable to scrubber sludge disposal. Alternative disposal methods available for scrubber sludge, including deep mine disposal, strip-mined land reclamation, and utilization, possess some degree of potential. Based on presently available data, there are no insurmountable technological problems in disposing of scrubber sludge in an environmentally acceptable manner.

STATUS

Available from: NTIS $7.25/MF $1.45 - Pb-233 144/5

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Pilot Scale Treatment of Wine Stillage

CITATION

E. D. Schroeder, California, University of Davis, Ca.

ABSTRACT/SUMMARY

Pilot and laboratory scale studies were run on aerobic and anaerobic biological treatment of winery stillage over a two year period. The pilot scale studies included work with aerobic lagoons and anaerobic packed towers. Laboratory systems studied were aerobic reactors without recycle and batch fed anaerobic process. Because suspended solids removal proved to be a key factor in successful biological treatment, centrifugation, detartration, coagulation and flocculation, and combinations of these methods were included in the studies. Centrifugation proved to be the best method of removing solids prior to biological treatment. Solids removal in combination with an aerobic treatment process can be expected to produce final filtrate chemical oxygen demands of about 700 mg/l and a final filtrate BOD of about 75 mg/l. Anaerobic processes studied did not operate well but produced effluents with chemical oxygen demands of the order of 4000 mg/l.

STATUS

Completed EPA #660/2-75-002

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Interim Report of Task Force on Phosphate Removal Sludges

CITATION

J. B. Farrell, Advanced Waste Treatment Research Laboratory, EPA
Cincinnati, Ohio

ABSTRACT/SUMMARY

Information on dewatering properties of municipal wastewater sludges is scant and poorly organized. A Task Force has collected information on wastewater sludges with particular emphasis on sludge produced when lime, Fe +++, or Al +++ are added for the purpose of P removal to some portion of the wastewater treatment sequence. Data are presented on the thickening and dewatering characteristics of the sludges. Most of the information relates to the mass of sludge produced and its filtering properties. Sludges produced when lime is added to wastewater have greater solids content after settling and dewater of greater mass rates than conventional sludges. However, mass of sludge per volume of wastewater is greatly increased. Considerable information is available on such sludges. Sludges produced when AL +++ or Fe +++ is added the wastewater dewater more poorly than conventional sludges and sludge solids content is less. Sludge mass is greater than in conventional treatment but not as great as would be produced by lime addition. Information is clearly not yet adequate for accurately predicting dewatering properties of such sludges. Research studies and field investigation of the dewatering properties of the sludges produced by adding AL +++ and Fe +++ to wastewater are being continued.

STATUS

Publication available - NTIS - PB 238317/AS $7.25

INFORMATION CONTACT

Environmental Protection Agency
J. B. Farrell
(513) 684-8265
Cinn., Ohio 45268

PROJECT/TITLE

An Experimental High Ash Papermill Sludge Landfill - Report I & II

CITATION

O. B. Andersland, R. F. Vallee, W. A. Charlie, and D. W. Marshall,
Michigan State

ABSTRACT/SUMMARY

An experimental papermill sludge landfill was constructed and monitored to obtain engineering information essential to the development of guidelines and recommendations for the design and operation of solid papermill waste landfills. The experimental landfill consisted of two sludge layers with sand drainage blankets on earth dike for lateral confinement and a natural soil cover. The landfill was instrumented for settlement, water pressure, vertical and lateral earth pressure, temperature sludge unit weights, specific gravity, and water contents. Laboratory work was also conducted. A detailed description of the field behavior is given in the report along with predictions based on laboratory results and soil mechanics theory. Sampling of leachate from the sludge landfill at weekly intervals and laboratory analysis according to standard metals for the examination of water and wastewater provided documentation as to leachate composition. A lysimeter study provides information of changes in quality of the leachate when passed through selected natural soils.

The second annual report investigated slope stability by removal of one dike from the sludge landfill. The landfill was excavated to form a 3.4 slope and trimmed to 1.8 slope. Prior to construction, vane shear strength and Dutch cone resistance data were obtained. Slopes indicator and piezometers were installed Laboratory studies and analysis were also conducted. Leachate sampling and analysis documented changes occurring during the project period.

STATUS

Completed. Publication #670/2-74-076 a&b - NTIS - PB 239869/AS $7.00 (a)
NTIS - PB 239618 $7.50 (b)

INFORMATION/CONTACT

Environmental Protection Agency
N. B. Schomaker
(513) 684-4487
Cinn., Ohio 45268

PROJECT/TITLE

Optimization and Design Criteria of An Oil Activated Sludge Concentration Process

CITATION

N/A

ABSTRACT/SUMMARY

Laboratory and pilot plant studies and cost calculations were performed for a new process for the disposal of sewage sludge. The process consists of an oil assisted gravity separation of the majority of the water, followed by multiple effect evaportation to dryness in an oil slurry and incineration of the dry solids.

Secondary sludges are concentrated from about 0.5% up to 5-10% solids. The agreement of performance between laboratory and pilot plant results is good, and no scale-up problems were indicated. The process economics show an advantage of $13-32 a ton compared to the best known commercial technology for a 189 ton/day plant processing a 50/50 mixture of primary plus activated sludges to ash. Optimization of the process can result in greater cost reductions in the thickening and settling steps.

STATUS

Publication Data: GPO-EP 1.23/2:670/2-74-004 $1.40
NTIS - PB 234-173

INFORMATION CONTACT

Exxon Research & Engineering Co.
P.O. Box 8
Linden, New Jersey 07036
(201) 474-0100

PROJECT/TITLE

Sludge Disposal from Sulfur Dioxide and Particulate Removal Processes

CITATION

N/A

ABSTRACT/SUMMARY

DESCRIPTION: A study to summarize and evaluate existing data pertaining to sludge disposal. Investigate the potential methods for improving the characteristics of sludge, and recommend future testing required. The objective of the program is to evaluate the data which is available on sludge disposal and its properties so that a logical test program can be established. The scope of the program is to summarize and evaluate the methods for improving the characteristics of sludge, and to develop a test program for improving the characteristics of sludge. Existing data pertaining to sludge disposal is summarized.

STATUS

The paper study has been completed. A small pilot plant (1,000 lbs. per hr.) has been built, and produces a leachate from sludge which is being tested on a small scale vegetable farm. Good results have been attained, and trace elements and toxicity studies will be performed. The leachate is being used by fertilizer producers, also. Plant production will be increased to produce 3,000 lbs. of fertilizer.

INFORMATION/CONTACT

B. McKinney or James Crow
U.S. Tennessee Valley Authority
Chattanooga, Tenn. 37402
(615) 755-3011

PROJECT/TITLE

Study of Hazardous Waste Practices - Primary Metals Industry

CITATION

N/A

ABSTRACT/SUMMARY

This EPA sponsored project was initiated in May 1974. The objective of the study is to compile data which will be used as background in setting standards for the land disposal of toxic waste constituents from ferrous and non-ferrous smelting operations. In addition to compiling data from all available published sources, samples of solid wastes (i.e., sludges, slags, dusts) will be collected from plants and chemically analyzed at Calspan. Toxic constituents of interest include heavy metals (Pb, Zn, As, Cu, Hg, Cd, Cr), cyanide, chlorinated hydrocarbons, and others. Appropriate treatment and safeguards for safe land disposal will be identified and the corresponding costs estimated for typical plants.

STATUS

N/A

INFORMATION/CONTACT

R. P. Leonard
Calspan Corporation
4455 Genesee St.
Buffalo, New York 14221

D. Other/Miscellaneous

PROJECT/TITLE

Waste Citrus Activated Sludge As a Poultry Feed Ingredient

CITATION

R. H. Jones, J. T. White, and B. L. Damron Winter Garden Citrus Products Corporative Winter Garden, Fl.

ABSTRACT/SUMMARY

The report presents an evaluation of the potential of utilizing waste activated sludge as a poultry feed supplement. The sludge used in this study was obtained from an activated sludge process treating concentrated citrus waste containing no sanitary wastewater. The sludge was thickened, dewatered and dried using full scale and pilot-scale equipment. The dried sludge was then analyzed for protein, fiber, amino acids, nutrients and moisture. Poultry feeds containing varying concentration of sludge were prepared. Two experiments with broiler chicks, each of three weeks duration, one 8-week broiler study, and six-month laying hen study were conducted to determine the effect of the inclusion of sludge in poultry diets on performance. It is shown in this report that the inclusion of sludge in property formulate diets up to 7.5 percent did not significantly affect poultry performance or meat or egg quality. The value of the sludge was calculated based on the reduction in feed ingredients resulting from the inclusion of sludge. It was found that the value of the recovered sludge significantly reduced the total cost of sludge handling.

STATUS

Completed EPA #660/2-75-001

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Cost-Effectiveness Study for Handling and Disposal of Organic Sludges

CITATION

N/A

ABSTRACT/SUMMARY

The goal of this project is to develop mathematical model for all commonly used processes for sludge handling and disposal and to use these models in an Executive program which will size all processes and estimate the cost of the complete treatment train. Processes being considered are gravity thickening, air flotation thickening, centrifugation, anaerobic digestion, elutriation, aerobic digestion, vacuum filters, sand drying beds, multiple hearth incineration, and transport and disposal to land. A total of 181 ways have been identified to handle and dispose of both primary and waste activated sludge. Computation of the cost of these alternative processes will begin when models for aerobic digestion and land disposal have been completed.

STATUS

Completed - Proceedings of the National Conference on Sludge Disposal,
Pages 30-60, Aug. 1975

INFORMATION/CONTACT

Richard Eilers or Robert Smith
NERC
5555 Ridge Ave.
Cinn., Ohio 45213
684-2200, 8352

PROJECT/TITLE

Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine factors influencing long-term utilization of wastes compatible with sustained agronomic production with emphasis on accumulation of toxic quantities of heavy metals in soils and plants.

APPROACH: From strip mine spoil areas, surface and core samples to water table depth will be analyzed for total pyrites, sulfides and redox potentials before and after sludge treatments. Results will be used to evaluate effectiveness of sludge in revegetation of strip mine spoils and in abatement of pollution in runoff and leaching waters. Analyses will include ph, SO(4), NO (3), Zn, Cu, Cd, Ni, Co and Pb.

PROGRESS: The field work associated with this project, the Palzo reclamation project, continues to have unavoidable delays. The ongoing research involves laboratory and greenhouse studies. The sulfur fractionation scheme was modified for sludge samples using freeze-dry techniques to remove the water phase. The Palzo strip mine spoil contains about 1.5 to 2.0 percent total sulfur, 52 percent being in the pyrite form. In the sludge about 43 percent of the S is CHCl(3) soluble and mostly in the elemental form. Adding sludge to spoil material increased the pH of the spoil from 3.2 to 5.3 initially but with 70 days of continued aeration the pH's dropped to the original level. Eh values decreased with sludge treatment. Water soluble S increased slightly and pyrite S oxidation decreased with increasing sludge applications. Continuous seration exodized less pyrite material under high sludge rates than under low application rates. High sludge applications expressed Ni and Al absorption by plants.

STATUS

Completed - Waiting to be published.

INFORMATION/CONTACT

S.W. Melsted
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Turner Hall
Arbana, Ill. 61801
(217) 333-4376

PROJECT/TITLE

Upland Disposal Concepts Development

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluation of new disposal alternatives such as using pits and mines and investigation of systems for the long-distance transport of dredged material to inland disposal areas.

APPROACH: The confined land disposal of dredged material is being addressed by a number of work units in the Dredged Material Research Program (DMRP). Disposal area operation improvements, landscaping or aesthetic enhancement, reuse to extend life expectancies of new or existing sites and subsequent productive use of filled sites are topics under consideration. However, under the assumption that confined disposal on land will continue as a requirement at a constant if not accelerated rate in certain regions, additional efforts are necessary to identify new locations for dredged material disposal to augment the other considerations.

STATUS

N/A

INFORMATION/CONTACT

Dr. R. T. Saucier
F. H. Griffis
U. S. Army
Waterways Experiment Station
P.O. Box 631
Vicksburg, Mississippi 39180

PROJECT/TITLE

Disposal Area Reuse Research

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Investigation of dredged material improvement and rehandling procedures aimed at permitting the removal from containment areas for landfill or other uses elsewhere. Results will be disseminated to Corps of Engineers Districts for use in the planning and implementation of dredged material disposal operations to increase the useful life of confined disposal areas while minimizing the environmental impact.

APPROACH: The new land needed each year to confine dredged material on land is significant. In many cases new land is no longer available, and when and where it is, the dredging costs are greatly increased by land acquisition, longer pumping distances, and environmental restraints. This research is aimed at developing and recommending concepts for land disposal area reuse. Techniques will be developed for continuous or periodic removal of improved dredged material for use or storage elsewhere so that the useful life of a disposal site can be increased and the pressure for acquisition of new land can be subsequently decreased.

This study is aimed at developing the reusable site as a collection and processing site where valuable material is made available for productive uses while unwanted material is, if necessary, treated and disposed of. Research has been completed on processing the dredged material to obtain usable resources (such as gravels, sands and landfill material requirements) and on legal and other constraints associated with marketing material containment areas. Research has been initiated to develop techniques and equipment for mechanical separation of fine-grained dredged material and the identification of alternative power sources for dredged material disposal operations. A survey is being conducted of the Corps districts to gain their input for planning and development of the reusable site concept. In the final stages of this study, a systems approach will be used to develop concepts and procedures where the functions of the disposal area are considered as integrated and coordinated activities rather than individual and independent functions.

STATUS

N/A

INFORMATION/CONTACT

C. C. Calhoun
R. T. Saucier
U. S. Army
Waterways Experiment Station
Vicksburg, Mississippi 39180

PROJECT/TITLE

Treatment of Contaminated Dredged Material

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluation of physical, chemical and/or biological methods for the removal and recycling of dredged material constituents. Results will be disseminated to Corps of Engineers Districts for use in assessing the environmental impacts of disposal operations and the planning and implementation of dredging and disposal projects.

APPROACH: This work unit will be directed toward the eventual demonstration of full-scale field pilot testing of various treatment processes for dredged material. Such efforts will be designed to indicate the technical, economical, and ecological feasibility of treatment in connection with various types of water and land disposal operations. An initial effort will be the assessment of presently available chemical, physical, and biological treatment processes. Those processes most promising for treating dredged material, primarily from the operational standpoint, will be selected for subsequent modification and development. All processes will be evaluated in terms of their potential for use in connection with both land and water disposal operations. In addition, laboratory studies will be initiated as an early effort. These studies will be designed to provide information on the basic effectiveness of various known treatment processes on varying types of dredged material. Design information, necessary to scale up to subsequent field pilot studies, will also be provided.

Careful examination and revision of criteria may reduce the percentage of material considered polluted and therefore reduce the percentage of material that must be disposed of on land. However, research concerning land disposal may indicate severe environmental effects which could also preclude this alternative. This work unit, will address the remaining alternative, treatment of dredged material to remove contaminants so that the dredged material or the effluent from confined containment areas may be safely returned directly to the water.

INFORMATION/CONTACT

Dr. C. C. Calhoun
R. T. Saucier
U. S. Army
Waterways Experiment Station
P.O. Box 631
Vicksburg, Mississippi 39180

PROJECT/TITLE

Evaluation of Hygiene & Welfare Aspects of Solid Waste Disposal Practices

CITATION

N/A

ABSTRACT/SUMMARY

To conduct a problem definition study of the hygiene and welfare aspects of solid waste management at US Army hospitals and in the Theater of Operations. The handling of solid waste in the Theater of Operations is a military-unique situation.

Two separate studies will be conducted, one in the area of hospital wastes and a second on solid waste in the Theater of Operations. The hospital waste problem will be approached by reviewing available literature, consulting with personnel currently surveying the problem, reviewing applicable laws and regulation and finally consolidating and analyzing the available information and defining areas where additional studies are required. In the theater of operations, current disposal techniques will be reviewed and recommendations made as to areas of required additional study.

Supporting agency address information: MDRDC Medical Bioengineering R&D Lab Ft. Detrick, Md. 21701

STATUS

N/A

INFORMATION/CONTACT

J. J. McCarthy
U. S. Army
Bioengin. Res. & Dev. Lab.
Fort Detrick
Frederick, Maryland 21701

PROJECT/TITLE

Refuse-Drived Fuel - Receiving and Storage Facilities

CITATION

N/A

ABSTRACT/SUMMARY

This study evaluates transporting processes solid waste by rail and truck from 19 central processing facilities to the power plant site, and the alternate sites to integrate the receiving and storage facilities with the power plant and will on advanced waste water treatment plant. The study develops conceptual designs for facilities to unload, store and convey the refuse derived from the transporting vehicles to the power boilers.

STATUS

N/A

INFORMATION/CONTACT

H. E. Jones
C H 2 M Hill Incorporated
P.O. Box 428
Corvallis, Oregon 97330

PART II - SOLID DISPOSAL

II. SOLID RESIDUAL WASTE DISPOSAL

A. PROCESSED WASTES - INDUSTRIAL

PROJECT/TITLE

Waste Oil Recycling and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This publication contains information on the generation, collection and disposal of waste oil. It is a technical evaluation of current refining, and other disposal processes and an assessment (environmental) of the gaseous, liquid and solid wastes discharged from such processes. A feasibility test was conducted in a single metropolitan area for a survey designed to obtain information from service stations, waste oil collectors, and industrial users. The project also south to obtain a national material balance to determine the ultimate fate of used oils.

STATUS

Project completed. Publication: GPO-EP1.23/2:670/2-74-052 $4.00
NTIS PB 234857/AS $6.50

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Industrial Chemicals Solid Waste Generation. The Significance of Process Changes, Resource Recovery, and Improved Disposal.

CITATION

Final rept. Saxton, James C.; Kramer, Marc. Arlington, Va., June 1974, 155 p.

ABSTRACT/SUMMARY

The study characterizes the process-related solid wastes produced during manufactures of industrial chemicals, Sic group 281. Thirty three chemicals were selected that: possess significant resource value, pose a difficult solid waste disposal problem, and/or have markedly deleterious properties, e.g., toxicity. The selected chemicals composed 40% of 1971 group output and an estimated 95% of the group's solid waste. Fifteen of the chemicals are undergoing process substitutions; in every case the newer process generates less solid waste. Most of wastes are of intrinsically low value, so resource recovery is seldon economic. Inorganics account for over 90% of total disposal cost, due to large waste volume from pre-related processes, such as alumina and phospheric acid. Organics appear to pose little disposal problem. Elimination of water discharge doubles the disposal cost of the 33 chemicals.

STATUS

Available from NTIS Pb-233 46417 pc $5.00/MF $2.25

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Elimination of Water Pollution by Recycling Cement Plantdusts

CITATION

N/A

ABSTRACT/SUMMARY

Objectives overall - Elimination of problems associated with disposal of kiln dust from cement plants. Specifically by: 1) Formation of clinker with concomitant violatilization of alkalies. 2) Leaching of water-soluble alkalies and return of leachate to system. 3) Other uses of dust, fertilizer, soil stabilizer, or agricultural limestone. 4) Use of dust as admisture to modify cement or cement products. Present approach - Heat treatment of clay or shale fraction to remove alkalies from a portion of raw feed and/or to remove alkalie from total dust. Fluid bed furance to remove alkalies at low temperature by control of the furance atmosphere presently underway.

STATUS

The project is in the final writing stage. It was deemed somewhat successful by the investigators. Water soluble alkalies in cement dust were removed by flame-spraying.

Other phases of the project will continue until maximum results are gained. The project will be funded by private industry upon the exhaustion of governmental funds.

INFORMATION/CONTACT

Dr. Miller
Protalnd Cement Association
5420 Old Orchard Rd.,
Skokie, Ill. 60076
(312) 966-6200

PROJECT/TITLE

Study of Solid Waste Management Practices in the Pulp and Paper Industry

CITATION

Final rept. Gorham International, Inc., Maine. Environmental Protection Agency, Rockville, Maryland Solid Waste Management Office, Feb. 74; 198 p

ABSTRACT/SUMMARY

This report investigates and identifies present solid waste management practices, examines alternatives, and develops strategies for future pulp and paper industry waste management. It examines waste management in five major segments of the pulp and paper industry; pulp mills, paper mills, paper board mills, and de-inking mills. Data is presented on pulp and paper industry solid waste generated since 1960. A case study for each of the five major pulp and paper manufacturing segments is presented.

STATUS

Available from NTIS Pb-234 944/7 $5.50/Mf $2.25

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Effects of Water Pollution Controls on Solid Waste Generation, 1971 to 1985: Executive Summary

CITATION

R. Stone, Ralph Stone and Company, Inc. Los Angeles, California

ABSTRACT/SUMMARY

The effects of air and water pollution controls on solid waste generation were evaluated. The solid wastes from pollution control were identified for individual industrial sectors by their original air or water pollutant constituents, and the treatment process applied. The wastes were categorized by type and by location (rural or urban). Total solid waste from pollution control activities were estimated for 1971 and projected for 1985. Particulates and sulfur oxides were identified as the major air pollutants capable of generating solid wastes when treated; suspended solids and biological oxygen demand were identified as the principle means of estimating the impact of water pollution control on solid wastes.

STATUS

N/A

INFORMATION CONTACT

Environmental Protection Agency
R. J. Talley
(513) 684-4484

Cinn., Ohio 42568

PROJECT/TITLE

Utilization of Wood Waste Particles

CITATION

N/A

ABSTRACT/SUMMARY

Wood as an energy source is being explored. Initially, the relationship between moisture content (oven dry basis) and gross heat of combustion measured by a calorimeter was determined for hardwoods, bark and waste papers. Presently work is projected to examine feasibility of communities established with wood as sole energy source. Processing variables are being examined.

STATUS

N/A

INFORMATION/CONTACT

W. K. Murphey McIntire Stennis Program
Penn. State University
School of For. Resources
201 Shields Bldg.
University Park, Pennsylvania 16802

PROJECT/TITLE

Feasibility of Utilizing Solid Waste as a Supplemental Fuel in Some of Tennessee Valley Authority's Steam Electric Plants (Abbrev)

CITATION

N/A

ABSTRACT/SUMMARY

The study examines the feasibility of adapting one or more of TVA's steam plants to burn refuse as a supplementary fuel. TVA will also examine the economic feasibility of generating methane or methanol from the waste and using it as peaking turbine fuel.

STATUS

N/A

INFORMATION/CONTACT

U.S. Environmental Protection Agency
401 M St. S. W.
Washington, D.C. 20460
Office of Solid Waste Mgmt.

PROJECT/TITLE

Solid Waste Program - Power Plant Evaluation of Pyrolytic Oil

CITATION

N/A

ABSTRACT/SUMMARY

DESCRIPTION: In cooperation with the County of San Diego, San Diego Gas & Electric is preparing to modify a steam electric plant to evaluate the product of a 200 ton per day solid waste recovery demonstration plant. This demonstration plant, to be built and operated by the County of San Diego in cooperation with the Environmental Protection Agency and the Garrett Corporation, will convert municipal refuse into a synthetic fuel by pyrolysis. San Diego Gas and Electric expects to determine the feasibility of using this synthetic fuel for the production of electric power.

STATUS

N/A

INFORMATION/CONTACT

H. K. Bishop
San Diego Gas & Electric Co.
101 Ash Street
San Diego, California 92112

PROJECT/TITLE

The Better Whey; A Dilemma

CITATION

Proceedings: Second National Symposium on Food Processing Wastes, Sidney Boxer. U. S. Environmental Protection Agency, Wash., D.C. 3/1971. pp. 409-412.

ABSTRACT/SUMMARY

The cheese industry has the problems of waste whey, a heavy pollutant because of its high BOD and yet a food by-product with excellent nutritive value. Dairy Research and Development Corporation suggests the establishment of regional whey recovery plants to treat the whey from surrounding industries since whey recovery is such an expensive process that small dairy processing plants cannot afford to install the equipment. This research and development outfit has built a demonstration plant at Vernon, New York in cooperation with Dairylea of New York. Whole whey for use as a food or food additive is recovered at this facility by spray drying, the most efficient and economical method discovered by previous research. Laval Separator Company has built the equipment for the demonstration plant. One of the major problems encountered in this project was the conversion of cottage cheese whey, which is more acidic than hard-cheese whey and more difficult to process. (D) (G)

This document is retained in the SWIRS library.

STATUS

N/A

INFORMATION/CONTACT

N/A

B. PROCESSED WASTES/FOOD INDUSTRY

PROJECT/TITLE

Techniques for Disposal of Wastes from Fruit and Vegetable Processing Plants

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVES: Evaluate methods for disposing or reducing saline wastes from food processing operations. Develop techniques for utilizing or reducing solid and liquid wastes from food processing plants. Determine whether pesticide residues, if present, can be reduced in or removed from food processing wastes.

APPROACH: The wastes will be subjected to separation, extraction of various components, dehydration or fermentation, submerged combustion, and other chemical treatments, where applicable. The main commodity wastes will include cucumbers, cabbage and tomatoes.

PROGRESS: Progress has been made in water reuse thereby reducing the total volume for disposal. Solid wastes are high in protein and have no antinutritional factors. Cucumbers cured in recycled brine were as good as or slightly better than those cured in fresh brine. Recycled brine was filtered and used for fresh pack pickles.

The final effluent is disposed of in lagoons. Spray irrigation of the effluent on fields is now being tested.

STATUS

Project still in progress.

INFORMATION/CONTACT

J. R. Geisman
Ohio State University
and Ohio Research & Development Center
20001 Fyffe Court
Columbus, Ohio 43210
(614) 422-5169

PROJECT/TITLE

Seafood Solid Waste in Oregon: Disposal or Recovery

CITATION

Special rept: Kreag, Rebecca; Smith, Frederick J.

ABSTRACT/SUMMARY

The quantity and nature of seafood waste from processing operations are described. Ten alternatives to discharge directly into estuaries are presented. Three methods of disposal were studied for these wastes: incineration, barging off shore and landfill. Landfill appears to be the least costly and the most promising disposal alternative because of the limited quantity of wastes involved. Seven alternatives were considered for recovery of wastes for a marketable product: flesh for human consumption; fish protein concentrate; fishmeal; mink feed; fish food; fertilizer; and chitin for new special products.

STATUS

NTIS $3.00/MF $1.45 COM-74-11245/9

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Improved Waste Handling Methods in Commerical Hatcheries and Poultry and Egg Processing Plants

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Abate pollution of air and water, develop improved methods of collecting, conveying and handling wastes from hatcheries, poultry, and egg processing plants.

APPROACH: Evaluate current waste handling systems for hatching and processing poultry and poultry products relative to manpower and equipment requirements and pollution potential. Develop improved methods by considering various principles, including mechanical conveying, pumping action, pneumatic tube (both positive and negative pressure), and other devices, to abate pollution of the air and water, increase labor productivity and worker safety, and maintain sanitary standards. Construct prototype devices and systems and test in laboratory pilot plant and in commercial operations. Publish guidelines and design specifications for industry use.

STATUS

PROGRESS: A commercial scale pneumatic system has been designed, developed and installed in a commercial plant for collecting, conveying, and discharging solid wastes (head, feet, inedible viscera, feathers) without the use of water. This experimental system is now operating successfully and is being evaluated and modified for effectiveness and reliability. It is an alternate way of handling processing waste to abate effluent pollution and minimize water requirements.

INFORMATION/CONTACT

R. E. Childs
W. K. Whitehead
U. S. Dept. of Agriculture
R. B. Russell Agric. Res. Center
P.O. Box 5677
Athens, Georgia 30604

PROJECT/TITLE

Techniques for Disposal of Wastes from Fruit and Vegetable Processing Plants

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluate methods for disposing or reducing saline wastes from food processing operations. Develop techniques for utilizing or reducing solid waste from food processing plants. Determine whether pesticide residues, if present, can be reduced in or removed from food processing wastes.

APPROACH: Solid and liquid wastes from various food processing plants will be obtained for treatment and analysis. The wastes will be subjected to separation, extraction of various components, dehydration or fermentation, submerged combustion, and other chemical treatments, where applicable. The main commodity wastes will include cucumbers, cabbage and tomatoes.

STATUS

PROGRESS: Solid wastes from tomato products manufacturers consist of about 50% seeds. The protein content of the seed is nearly 30% and is of high quality. The protein body is surrounded by a membrane, as indicated by electron microscopy, making extraction difficult. Since the waste has an equivalent oil content, extraction of this fraction will be evaluated as a preparative operation to protein extraction. Cucumbers cured in brine recycled for 1, 2 and 3 times were evaluated for hollow prickles (bloaters). Results indicate that the amount and severity of bloaters was inversely related to the number of times the brine was recycled. The more times the brine was recycled the less time required to cure cucumbers. Extensive increase in scale or recycling has been undertaken along with intensive assay of recycled brine to detect anti-bloater factor(s). A literature survey for cabbage constituents was conducted.

INFORMATION/CONTACT

J. R. Geisman
Ohio Agric. Res. & Dev. Center
Wooster, Ohio 44691

PROJECT/TITLE

Food Processing Wastes

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Initiate a research program dealing with the wastes generated by Oregon's primary food processing industry, involving: evaluation of waste occurrence and waste disposal systems currently being used; estimation of the extent and seriousness of present and future problems; establishment of guidelines for the selection of research which could most reasonably help alleviate the critical problems; and implementation of individual research projects involving waste reduction, waste treatment and by-product development.

APPROACH: The industry will first be surveyed by a questionnaire designed to reveal the origin, quantity, nature, composition, importance and cost and method of disposal or utilization of solid, agueous and gaseous wastes. This will be followed by one-site analyses, using a portable laboratory built for this purpose, of specific waste streams to gather more detailed data on each segment of the industry. From these data, problems will be categorized by common methods of approach and research will be undertaken to alleviate these problems.

STATUS

PROGRESS: The wastewaters generated during the primary processing of most of Oregon's major fruits and vegetables and nearly all Oregon seafoods have been characterized. In addition, many inplant unit operations have been investigated and their pollutional contributions evaluated. Where possible, processing modifications are being recommended to minimize waste production and maximize yields of saleable products.

INFORMATION/CONTACT

M. R. Soderquist
Oregon State University
Agric. Experiment Station
126 Agriculture Hall
Corvallis, Oregon 97331

C. NON-PROCESSED WASTES

1. INSTITUTIONAL

PROJECT/TITLE

Waste Disposal Systems for Cold Regions

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of this project is to develop techniques and criteria for disposal of waste from military facilities, and for predicting, evaluating and controlling the effects of these waste on environmental quality in cold regions.

Major areas of research include treatment of wastewater by application to land as well as management of thermal and solid wastes. Significant aspects of the work with a final report will be issued upon completion of work in each problem area.

STATUS

Continuous project.

INFORMATION CONTACT

Wesley Pietkiewicz
U.S. Army
Col Regions Research and Engineering Lab.
P. O. Box 282
Hanover, New Hampshire 03755

PROJECT/TITLE

Annotated Bibliography on Hospital Solid Wastes Collection Treatment and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project consisted of compiling an annotated bibliography of the available literature on hospital solid waste collection, treatment, and disposal systems. Literature on microbiological or health aspects related to the various systems is included.

STATUS

The project is completed. Publications may be obtained from EPA (Publication EP #00458-02S1)

INFORMATION/CONTACT

Oscar Albrecht, Project Officer
Solid and Hazardous Waste Research Laboratory
National Environmental Research Center
Cincinnati, Ohio 45268

PROJECT/TITLE

Economic and Decision-Making Efforts on The Delivery and Financing of Community Services

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Identify factors related to variations in unit costs of the solid waste disposal systems in a smaple of Ohio communities. Determine the least-cost solid waste collection, storage and disposal system for a case county in Ohio. Determine Ohio non-metropolitan local government officials' major problems, suggested solutions and factors influencing their "weighting" of individual community services.

APPROACH: Data on types and costs of solid waste collection, storage and disposal systems will be collected primarily by a mail survey to a sample of local government officials, private haulers and citizens. A linear programming transport type model will be used to determine the least-cost county-wide solid waste disposal system for a case county in Ohio. A sample of Ohio non-metropolitan local government officials will be contacted by a mail survey. A sub-sample of this group will be selected for follow-up personal interviews.

STATUS

PROGRESS: A solid waste feasibility study of Wayne County, Ohio is nearing completion. The study has involved the development of waste generation coefficients for the residential, commercial, and industrial sectors, and waste generation projections were made to the year 2000. A cost effectiveness analysis is being conducted on eight collection/storage and eight disposal/recovery options to determine the most cost-effective system. I have also assisted Ohio EPA in developing and conducting a state-wide survey of solid waste facilities and practices. These survey results should be available by March 1, 1975. An analysis of rural emergency ambulance service is just getting underway. The study is part of a regional research project (NC-123) and will focus on a multi-county rural area in Southern Ohio. It is concerned with determining the factors related to variation in response time of a sample of volunteer emergency ambulance services. A third activity is concerned with financing community services and has involved an analysis of Federal revenue sharing allocations by type and size of government in Ohio. This study has also involved projecting revenue allocations based on various modifications in the local allocation formula.

INFORMATION/CONTACT

F. J. Hitzhusenn   Agricultural Econ & Rur Sociol.
Ohio State University
School of Agric. & Home Econ.
190 N. Oval Dr., 102 Administration Bldg.
Columbus, Ohio 43210

PROJECT/TITLE

Solid Waste Handling and Disposal at Naval Shore Facilities

CITATION

N/A

ABSTRACT/SUMMARY

To develop improved system, procedures, and equipment for the collection, transport/disposal of solid wastes generated ashore, including the solid waste offloaded from moored or berthed navy vessels.

Define system, procedures, methods and equipment (new and modified) that will assist the Navy in meeting requirements for handling and disposal of solid waste. This involves a review of work already done and underway by government, commercial and other military agencies that may influence future naval solid waste practices. Handling processing and disposal systems will be defined from the point of generation to final disposal. Prototype equipment development in areas of critical need will be developed, tested and evaluated as appropriate prototype equipment, systems and procedures will be selected for field evaluations. Work will emphasize scientific and engineering developments related to specific navy needs, including cost/effective solutions to pollution abatement and resource recovery.

STATUS

N/A

INFORMATION/CONTACT

R. A. Boettcher
J.S. Williams
U.S. Navy
Civil Engineering Lab.
Point Mugu
Port Hueneme, California 93041

Supporting Agency Address Information: Naval Facilities Eng. Command 032B
Alexandria, Virginia 22332

PROJECT/TITLE

Solid Waste Management For Military Facilities

CITATION

N/A

ABSTRACT/SUMMARY

To study generation, collection transportation, recycle/reuse and disposal of solid wastes at military installations in order to develop procedures and guidance to assist the facilities engineer to solve his solid waste management problems using the resources currently available.

Factors affecting the generation of solid waste at a military facility will be identified and minimization potential will be explored. Character and density of loose and compacted Army solid waste will be determined. Collection routes will be optimized using available DOD manual and computer-aided methods. Engineering evaluation of emerging specialized equipment and techniques for solid waste will be initiated and maintained. Demonstration of collection alternatives to current Army practices will be accomplished. Consultation on the solution of site-specific problems will be provided.

Supporting agency address information: OCE Construction Engineering Research Laboratory, P.O. Box 4005, Champaign, Ill. 61820.

STATUS

N/A

INFORMATION/CONTACT

W.J. Mikucki
U.S. Army
Constr. Engin. Research Lab.
P.O. Box 4005
Champaign, Illinois 61820

PROJECT/TITLE

Improve Sanitation, Operational Efficiency, and Waste Handling in Retail Food Stores

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Develop an economic evaluation of, and recommendations and procedures for, improved sanitation practices, waste management systems, and handling methods associated with returnable bottles and containers in retail food stores.

APPROACH: Research will be conducted on the costs, problems and benefits associated with improving sanitation practices and procedures for handling returnable bottles and containers in independent retail food stores. Work will be conducted to evaluate problems associated with implementing guidelines and recommendations for a total store sanitation program. Evaluate and develop recommendations for methods that may be used by voluntary and cooperative wholesale suppliers to select and implement solid waste management systems within their distribution regions and will encourage and enable their retail store members to participate and benefit from solid waste reclamation.

STATUS

Cost and time data has been obtained on alternative procedures for handling solid waste in supermarkets and convenience stores, and is being prepared for publication. Costs of alternative waste handling systems in 10 supermarkets ranged from $27.60 per ton to $83.80 per ton of waste generated. Systems evaluated included stationary compactors, balers, conventional and starved air incinerators, and bulk storage containers. A handbook to select the best system for a store is being prepared. Cost-benefits of implementing a total store sanitation program are being determined.

INFORMATION/CONTACT

H.S. Ricker
U.S. Dept. of Agriculture
Food Distribution Res. Lab.
Beltsville, Maryland 20705

PROJECT/TITLE

Governmental and Private Services

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Provide services to governmental agencies, industries and individuals to help solve water supply, waste disposal, stream pollution and air pollution problem in cases where such services are not available from other sources, provide opportunity for faculty and students to experience practical problems and to determine research needs.

APPROACH: Study and make recommendations on problem brought to our attention and to make routine visits to state institutions to assess water supply, waste disposal or pollution situations which may lead to problems. Design assistance will be provided for systems as requested.

STATUS

The Bordentown, Johnstone, Skillman and Marlboro Institutions sent samples to the lab biweekly and were analyzed for BOD, S.S. and fecal coliform. This service is required to comply with Federal self-monitoring requirements. Field service (trouble shooting) was provided to rectify operational problems at: Bordentown iron removal water plant, Leesburg prison sewage treatment plant, New Lisbon water treatment plant, School of Conservation in Stokes Forest, Stockton State College. Reports concerning upgrading of sewage treatment facilities involving stream sampling and modelling were prepared for: New Lisbon State Colony, Woodbine School, Glen Gardner Hospital. An extensive field sampling and laboratory analysis program was undertaken this summer which involved sampling water and sewage treatment facilities at thirteen institutions. Each institution was sampled three times.

INFORMATION/CONTACT

E.J. Genetelli
Rutgers The State University
Agric. Experiment Station
Old Queens Bldg.
New Brunswick, New Jersey 08903

C. NON-PROCESSED WASTES

2. MUNICIPAL

PROJECT/TITLE

Flyash Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This project involved the disposal of flyash as a slurry in a worked out mine. The resultant mixture of slurry water and mine water were chemically treated before discharge to a stream. This project has been in existence for the past five years and is scheduled to continue for another 5 years.

The dissolved salts in the discharge has dropped from 3000 PPI to 2000 PPI to date. Research is continuing to reduce the salt content to 1500 PPI or lower. The state of Penn. treats the discharge as a process rather than a mine effluent. The present PPI would be allowable if the discharge was treated as mine drainage. However, the mechanism is working well, and research will continue.

STATUS

Ongoing project. Information will be sent upon request.

INFORMATION/CONTACT

Mr. Robert O'Hare
Mr. Nelson Tonet
Duquesne Light Company
435 6th Avenue
Pittsburgh, Pa. 15219

PROJECT/TITLE

Management of Forested Watershed for Water Yield Production and Wastewater Disposal - W. E. Sopper

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this study were: (1) To investigate the effects of watershed management techniques on the quantity and quality of water yield form small forested watersheds, (2) To investigate the hydrologic behavior and response of a 20 acre forested drainage basin to selected rainfall events applied with an artificial rainfall facility, and (3) To investigate the potential use of forests as disposal sites for treated municipal wastewater and sludge.

STATUS

Completed. Publication: Conference on Recycling Treated
Municipal Wastewater Through Forest & Cropland

GPO-EP 1.23/2 660/2-74-003 $1.20
NTIS-PB 236313/AS

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Fly Ash Filter Aid for Sewage Solids Dewatering and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project demonstrated the use of fly ash from a nearby power plant and sludge incinerator ash as filter aids in the pressure filtration of sludges. Pilot plant tests indicated that due to the nature of the sludge from the trickling filter plant other alternate methods of pretreatment would incur severe economic penalties. On the other hand the chemical ingredients in the fly ash and sludge incinerator ash, which were obtained at no cost, permitted adequate dewatering at minimum cost. In addition, the trace minerals in the ashes and the plant food value from the sludge constituted a useable soil conditioner. The City of Cedar Rapids plans to utilize some of this sludge as a soil conditioner and fertilizer in their parks.

STATUS

Project completed. Publication: GPO-EP1.23/2:R2-73-231 $2.10
NTIS-PB 223-535

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Potential Solid Waste Generation and Disposal from Lime and Limestone Desulfurization Processes. R. J. Evan - Author

CITATION

N/A

ABSTRACT/SUMMARY

The generation and disposal of solid waste from electric utility plants using a line/limestone wet-scrubbing system and the potential effects on the environment were estimated for 1975 and 1980. The study indicated that in 1975 approximately 5.8 million tons of desulfurization solid waste (50 percent solids) will be generated. In 1980, when it is estimated that desulfurization will become commercially accepted, approximately 71.4 million tons of this material will be generated for disposal and/or utilization. The desulfurization waste material, when combined with lime, fly ash, and water, may have potential for use as a roadbase material, landfill reclamation, and synthetic aggregate.

STATUS

Publication $2.25 - NTIS PB-233 975/2

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Criteria for Site Selection and Operation of Sanitary Landfills

CITATION

N/A

ABSTRACT/SUMMARY

The objective of the project is to determine the authority needed to acquire land for and operate sanitary landfills; identify and evaluate powers of local governmental units and limitation of those powers to adopt and enforce land-use restrictions and regulations as they relate to sanitary landfills, and other restrictions such as environmental protection standards that affect site location; identify reasons for and extent of institutional arrangements needed for solid-waste management on an areawide basis.

State enabling legislation, administrative rules, regulations and guidelines, local ordinances, and judicial decisions applicable to site acquisition, location restrictions, landfill operations, and funding requirements were collected for most of the North Central States and analyzed. A questionaire was used in an endeavor to ascertain the reasons for and extent of opposition to location sanitary landfills in rural residential areas.

STATUS

This is an extensive project and is only half completed. Results and findings to date are discussed in the following publications.

1. North Dakota Law Review, "Solid Waste Management in North Dakota", Vol. 49, #3, Spring 1973, pp. 499-535
2. Public Works, Vol. 104, #3, 3/73
   Public Works, Vol. 104, #4, 4/74
3. Municipal Waste-Research Needs Related to the Institutional and Legal Aspects of Recycling Municipal Waste On The Land: Research on Land & Water Resources. Proceeding: Residential Needs Related To Recycling Urban Wastewater on Land. Penn. State University publication

INFORMATION/CONTACT

Dean T. Massey
Univ. of Wisconsin
U.S.D.A. Natural Resources/Economic Division
Madison, Wisconsin 53706
(608) 262-3568

PROJECT/TITLE

Hydrogeology of Solid Waste Disposal Sites in Northeastern Illinois

CITATION

Final Rept. 1 Jun 66-31; May 68 - Hughes, G. M.; Landon, R. A.' Farvolden, R. N.

ABSTRACT/SUMMARY

The study attacks one of the problems inherent in disposing of refuse on land; the ever-present danger that unless properly engineered in a sanitary landfill-the wastes will adversely effect ground-water resources. Hydrogeologic, and water quality studies of five landfills in northeastern Illinois were carried out. The distribution and concentration of dissolved solids in the vicinity of four of these landfills was found to be controlled by the configuration of the ground-water flow system. The major factors influencing the attenuation of the dissolved solids appear to be the particle size of the earth materials through which they move and the distance that they move.

STATUS

GPO/Mf $.095 - NTIS Pb-214 028/3

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Sanitary Landfill Technology

CITATION

Weiss, S. Los Angeles County study. In Sanitary landfill technology. Park Ridge, New Jersey, Moyes Data Corporation, 1974. p.252-269

ABSTRACT/SUMMARY

A study conducted by the County of Los Angeles, California, to formulate construction criteria for sanitary landfills and improvements which would lead to optimum land development and use is reported. Methods utilized in the study are described. Monitoring and predicting subsidence and compaction of landfill, gas movement and coantrol, and groundwater pollution from sanitary landfills are discussed. Criteria for the location, design, construction, inspection, supervision, and maintenance of sanitary landfills; for the uses of land on or adjacent to sanitary landfills; and for the development, construction, and maintenance of improvements to sanitary landfills established as a result of this study are discussed.

STATUS

SWIRS library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Water-Quality of Selected Solid-Waste Disposal Sites, Suffolk County, Long Island, New York

CITATION

Preliminary Findings of a Leachate Study on Two Landfills in Suffolk County, New York. By Grant E. Kimmel and Olin C. Braids. Journal of Research, U.S. Geological Survey, Vol. 3, No. 3, May-June 1975, p. 273-280

ABSTRACT/SUMMARY

In anticipation of the expected population growth in the county, water planning and management agencies feel the need for regulation in the operation of solid-waste disposal sites and in the selection of new sites, so as to prevent unreasonable or unnecessary deterioration of the quality of the ground water or of the environment. In drafting regulations, information is needed with regard to the character of the leachate and chemical reactions that may occur in the zones of aeration and saturation. In this respect information was needed on incinerated solid waste as well as the general variety of solid wastes.

The major objectives of this project were to (a) document the nature and extent of changes in the chemical quality of the ground water associated with solid-waste disposal at one or more selected sites, and (b) apply existing modeling techniques to predict the nature and rate of change (both as a function of time and space) of the chemical quality of the ground water. To the extent possible, modeling efforts involved the zone of aeration and the zone of saturation.

STATUS

N/A

INFORMATION/CONTACT

Dale Mosher - EPA/SWM
401 M St. S.W.
Washington, D.C. 20460 755-9125

PROJECT/TITLE

Evaluation of a Solid-Waste Disposal Site

CITATION

N/A

ABSTRACT/SUMMARY

Cortland County has proposed at landfill operation for disposal of solid-wastes in the near future. Substantial base line geologic and hydrologic data on the proposed site has been collected, and an array of 50 shallow wells has been emplaced and monitored on a weekly basis since April, 1973.

The primary objectives of this study are: (1) to determine in more detail the hydrologic regime of the landfill site and existent water quality, and (2) to evaluate the effect of landfill operations on this regime over an extended period of time.

The proposed study is particularly significant because considerable geologic and hydrologic parameters can be determined and monitored prior to landfill operation. Continuation of this study after initiation of landfill operations are expected to provide a critical evaluation of the sanitary landfill as a viable means of solid-waste disposal.

The proposed study basically involves the establishment and maintenance of a monitoring program for critical weather, hydrologic, and geologic parameters. Data thus obtained will determine the impact of landfill operations on the natural hydrogeologic environment of this area and adjacent parts of New York and Pennsylvania.

STATUS

Continuing Project.
Articles and publication are available upon request

INFORMATION CONTACT

Dr. T. E. Bush
State University of New York - School of Arts
Cortland, New York 13045

PROJECT/TITLE

Thermophilic Aerobic Digestion of Organic Solid Wastes
(Andrews, John F., Kambhu, Kawi)

CITATION

N/A

ABSTRACT/SUMMARY

The major reactions involved in the process of thermophilic aerobic digestion are presented, discussed, simplified into the basic stoichimetric, thermochemical, kinetic relationships. A simple procedure is presented for determining the thermochemistry of the net reaction by relating heat production to the oxygen equivalent or C.O.D. of the organic solids.

The simulation studies and mathematical model discussed employ conservative values of biological parameters. The mathematical model provides assistance in planning and conducting pilot plant studies.

STATUS

Final Report. - NTIS \$6.25/MF \$1.45
PB 222 396

INFORMATION/CONTACT

Clemson University
S. C. Dept. of Environmental System Engineering
Clemson, S. Carolina 29631

PROJECT/TITLE

Feasibility of Using Forest Land for Sludge Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This project is investigating the feasibility of using forest ecosystems to absorb nutrient additions in the form of sewage sludge. This research is important to the current problem of water pollution caused by nutrients leaching from sludge disposed of either by dumping at landfill sites or by other means that do not incorporate recycling or nutrient removal.

STATUS

Completed and waiting to be published (April 77).

INFORMATION/CONTACT

J. M. Hornbeck
University of New Hampshire Graduate School
Durham, New Hampshire 03824
(603) 868-5576, 9697
(603) 726-8902

PROJECT/TITLE

Demonstration of Non-Aqueous Sewage Disposal System for Recreational and Remote Areas

CITATION

N/A

ABSTRACT/SUMMARY

The overall objective was to demonstrate the feasibility and effectiveness of using a compact, closed-loop, non-aqueous system for collecting, transporting and disposing of domestic waste at remote and recreational areas where conventional methods of disposal are undesirable because of needs to protect recreational and underground waters and in areas where water is in short supply. It will be demonstrated that water conservation is achieved since a non-aqueous flush media will be utilized. The system was demonstrated and evaluated during both winter and summer seasons at a facility serving the recreational and tourist industry. The physical, biological, pathological, chemical and aesthetic characteristics of the flush media was demonstrated. Specific technical data determined and evaluated included: 1) Data on the useful life of the flush media, 2) Per capita waste loading to establish future design criteria, 3) Effectiveness of the incineration process, 4) Operational maintenance and reliability data to project optimum operational techniques and procedures.

STATUS

Completed EPA #670/2-73-088

INFORMATION CONTACT

N/A

PROJECT/TITLE

Relationship between Topographic Position and Contamination of Water Resources by Refuse Landfills

CITATION

N/A

ABSTRACT/SUMMARY

The proposed research was based on the hypothesis that contamination characteristics of ground and surface water, caused by refuse landfills, are related to the topographic position of the refuse site. Refuse sites are located on upland and valley surfaces. Landfills may be located in the upland or loess or glacial till and in valleys, may be located on floodplains, valley walls, or in gully positions. Refuse landfills representative of the various landscape positions and representative of different ages will be studied. Geophysical methods will be used to locate contaminated water boundaries and fill geometry. At each site bore holes were drilled, and water samples collected from them and from the adjacent stream during low flow condition. A major goal of the research was to relate topographic position with rate and direction of leachate movement and chemical characteristics of the contaminated ground and surface water. By relating these factors to landscape position characteristics of existing and potential sites can be evaluated and regulated for public safety.

STATUS

Completed. Several papers have been published in the journal Groundwater.

INFORMATION CONTACT

L. V. Sendlein
(515) 294-7814
R. C. Palmquist
(515) 294-7814

PROJECT/TITLE

Survival and Movement o of Viruses in Landfilled Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this project are to determine the survival patterns of viral pathogens in landfilled solid waste and to evaluate the potential contamination of water resources through leaching of viruses from a waste disposal site. Microbiologic monitoring leachates from Cells #1 and #2 is being conducted in order to determine the degree of health hazard involved in solid waste disposal by landfilling. The results so far indicate that polio virus may survive in compacted solid waste for at least 13 days at temperatures of 68-80 degrees F but the virus is inactivated in 2-4 days in a landfill with temperatures ranging from about 120-140 degrees F.

STATUS

Project completed. Pending

INFORMATION/CONTACT

Merzda Peterson
Research Triangle Park
Durham, North Carolina
x2601

PROJECT/TITLE

Effective Utilization of Municipal and Utility Sludges and Ashes

CITATION

N/A

ABSTRACT/SUMMARY

The object of the project was to: 1) Perform a comprehensive literature review and survey of the present municipal and utility sludge and ash production, disposal methods and utiliation methods. 2) Determine technical feasibility and economic practicality of more widespread application of present utilization methods. 3) Suggest new utilization methods with consideration of technical feasibility and economic practicality. A search of the literature and contact with a variety of governmental and trade organizations who are producers and/or present or potential users of sludges and ashes was conducted.

STATUS

Completed. Publication is pending. - Characterization and Utilization of Municipal and Utility Sludges and Ashes. Vol. 1

EPA #670/2-75-033 a,b,c,& d

INFORMATION CONTACT

N/A

PROJECT/TITLE

Solid Waste Treatment Research

CITATION

N/A

ABSTRACT/SUMMARY

Description: This research project will develop an engineering data base for solid waste resource recovery processing alternatives. An essential objective of this project will be to investigate alternative systems for potential advantages and disadvantages and conditions which favor the alternatives. This work will be done in conjunction with development of a design criteria for design and/or suitable process equipment selection. The emphasis during 1975 will be on investigating front end processing components such as shredding, air classification, magnetic separation and processes for conversion of the light combustible fraction from the air classifier into a "controlled quality salvage fuel" with physical characteristics necessary to permit amenable handling, storage, and firing into boilers for steam recovery ISG

STATUS

N/A

INFORMATION/CONTACT

Engineering Dept.
Boeing Company
7555 E. Marginal Way South
Seattle, Washington 98108

PROJECT/TITLE

Flyash Utilization

CITATION

N/A

ABSTRACT/SUMMARY

DESCRIPTION: Proposal abstract: Disposing of waste flyash is a growing problem for all coal-burning electric utilities. The trend in recent years has been to attempt to find ways to use waste ash in other segments of the economy. The object of this proposed research is to investigate the use of flyash as a combination filtration and adsorption media in the deep bed filtration of wastewater. Funding and manpower for this project are given in Project 6451.

STATUS

N/A

INFORMATION/CONTACT

D. G. Parker,
Civil Engin. Dept.
Univ. of Arkansas
School of Engineering
Fayetteville, Arkansas 72701

PROJECT/TITLE

Criteria for Site Selection and Operation of Sanitary Landfills

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine authority needed to acquire land for an operate sanitary landfills; identify and evaluate powers of local governmental units and limitation of those powers to adopt and enforce land-use restrictions and regulations as they relate to sanitary landfills, and other restricts such as environmental protection standards that affect site location; identify reasons for and extent of opposition to locating landfills in selected areas; recommend institutional arrangements needed for solid-waste management on an area-wide basis.

APPROACH: Study area will be North Central States. Examine State enabling legislation, administrative rules, regulations and guidelines, local ordinances, and judicial decisions applicable to site acquisition, location restrictions, landfill operation and funding requirements. Conduct mail survey of private citizens in selected areas and interview public officials to ascertain reasons for and extent of opposition to location of landfills. Analyze enabling legislation and recommend changes needed to permit area-wide planning and operation of landfills and to resolve group conflicts on site locations.

STATUS

State enabling legislation, administrative rules, regulations and guidelines, local ordinances, and judicial decisions applicable to site acquisition, location restrictions, landfill operations, and funding requirements were collected for most of the North Central States. These have been analyzed for several of the States. A questionnaire has been prepared and approved for a mail survey of private citizens, in an endeavor to ascertain the reasons for and extent of opposition to location of sanitary landfills in rural residential areas. Those questionnaires were sent to private citizens and the results are now being tabulated.

INFORMATION/CONTACT

D. T. Massey
Resource Policy Studies Center
Univ. of Wisconsin
School of Natural Resources
Agriculture Hall
Madison, Wisconsin 53706

PROJECT/TITLE

Solid Waste Management for Northwest Alabama Using Sanitary Landfills

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine best locations for specified numbers of sanitary landfills. Determine most efficient routing of pick-up vehicles for each locational pattern. Determine total operating cost for each locational pattern and the minimum cost solid waste collection and disposal system for Northwest Alabama. Present a programmed procedure which can be used by other regions and/or states for solving solid waste location and routing problems.

APPROACH: A location model will be used to determine best of possible sanitary landfill sites. Sites will be those places geologically suited for sanitary landfills not presently used for other purpose. "Lockset method of sequential programming" will be used to determine best routing pattern for collection vehicles for each site. Cost values will be assimilated and based upon derived size of each collection and disposal system. Costs will be compared to determine best organization for solid waste collection and disposal.

STATUS

A major portion of the research planned for the project has been completed. The completed economic analysis indicated that for the selected five-county study area in northwest Alabama cost savings could be realized through regional cooperation. The results permitted a determination of the best number and size for sanitary landfills to serve the entire area. The analysis also included an evaluation of the best routes for the pick-up vehicles to travel in collecting the waste material. The basic results have been distributed to leaders and planning agencies in the study area. A complete bulletin and several professional papers are presently being prepared and evaluated.

INFORMATION/CONTACT

W. E. Hardy
Agricultural Econ & Rur Sociol.
Auburn University
Agric. Experiment Station
Auburn, Alabama 36830

PROJECT/TITLE

Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine factors influencing long-term utilization of wastes compatible with sustained agronomic production with emphasis on accumulation of toxic quantities of heavy metals in soils and plants.

APPROACH: From strip mine spoil areas, surface and core samples to water table depth will be analyzed for total pyrites, sulfides and redox potentials before and after sludge treatments. Results will be used to evaluate effectiveness of sludge in revegetation of strip mine spoils and in abatement of pollution in runoff and leaching waters. Analyses will include pH, SO(4), NO(3), Zn, Cu, Cd, Ni, Co and Pb.

STATUS

The methods study for the analyses of acid mine drainage waters very high in Fe (0.1-5%), Al (0.1-2% and S(0.1-5%) has been spectroscopy, atomic absorption and wet analytical chemistry. The range in composition of the acid mine drainage waters have varied as follows, all values in ppm. P (5-1000), N (4-300), Ca (25-500), Mg (80-2000), Na (1-5), Mn (50-500), Cu (1-30), Zn (1-200), Ni (0.1-30), Cd (0.1-10), Cr (0.1-5) and Pb (0.01-1). Electric conductivity has ranged from 0.50 to 25.0 mmhos and the pH from 1 to 2.4. The cooperative strip mine reclamation project between the Department of Agronomy and the National Forestry Service involving the application of anaerobically digested sludge to high sulfur strip mine spoil showed that the acid mine leaching waters decreased significantly in Fe, Al, S, Cd, Co, Cr, Cu, Pb, N and P. Conversely, applying 20 tons per acre of agricultural limestone had no ameliorating effect on the leachate water. Laboratory studies following the influence on anaerobically digested sludge on the rate of pyrite oxidation are still in progress. They will be carried out for another 6 months, for a total of 24 months, before final evaluations are made. Four papers have been prepared and accepted for presentation, and eventual publication, at the American Society of Agronomy meeting in Chicago, Illinois, on November 11-14, 1974.

INFORMATION/CONTACT

S. W. Melsted - Agronomy
A. R. Gilmore
Univ. of Illinois
Agric. Experiment Station
Urbana, Illinois 61801

PROJECT/TITLE

Reduction of Ground Water Pollution Through Evapotranspiration Drying of Sanitary Landfills - An Intermediate Term Study

CITATION

N/A

ABSTRACT/SUMMARY

The problem being addressed is the pollution of ground water by sanitary landfill leachate. The proposed research will help to solve this problem by using interception and transpiration to dry the soil surface, refuse and surrounding soil, thereby, reducing leachate production. The research approach will involve the continuation of a study begun in project B-048-ALA entitled, "Reduction of Ground Water Pollution Hazard from Sanitary Landfills by Transpiration Drying." Three cylindrical lysimeters 42 inches in diameter and 12 feet in height E were constructed and filled with typical municipal refuse in the early spring of 1973. Two of the lysimeters were vegetated while the third was maintained in a fallow condition and used as a control. All three lysimeters are now producing leachate, which can be collected at will. The proposed study will involve removing all leachate from the drains of the lysimeters at monthly intervals and transporting it to the Auburn University Sanitary Engineering Laboratory for study. Following termination of the project in the spring of 1976, the lysimeters will be dismantled and the extent of root growth determined. The results, which will involve a total of 3 years of data, will enable a solid evaluation to be made of the effect of evapotranspiration drying on leachage production.

STATUS

N/A

INFORMATION/CONTACT

Dr. F. J. Molz
Auburn University
School of Engineering
Auburn, Alabama 36830

PROJECT/TITLE

Denton Landfill Project

CITATION

N/A

ABSTRACT/SUMMARY

Low, moderate, and high loading rates of sludge and of refuse, each separately, and both together, will be incorporated into the topsoil of 36 separate plots, of 0.13 acre each, during summer 1975. Crops will be seeded into those plots. Crops used will be a single variety of grass and a single variety of legume known to be favored by local farmers; these will be planted in three modes: each separately and both together (interplanted).

The trial will assess the effects of various loading rates of sludge and of refuse on the environment and on the crop, when these are incorporated into agricultural topsoil. These effects will be evaluated by laboratory analyses of samples of crops, soil, and water taken from each of the plots. The analyses will investigate crop yield and quality, soil water-holding capacity, concentration of any toxic metals that may be detected, and search for bacterial and viral pathogen persistance.

STATUS

N/A

INFORMATION/CONTACT

G. Stanford
Inst. For Storm Research Inc.
Houston, Texas 77006

PROJECT/TITLE

Demonstration of Multi-Material Source Separation In An Urban Area

CITATION

N/A

ABSTRACT/SUMMARY

The program involves establishing a multi-material source separation system in an urban area, Somerville, Massachusetts: Weekly curbside collection of flat paper and mixed cans and glass; and use of a compartmentalized collection vehicle. Program elements include: 1) Feasibility analysis (already completed); 2) Program design; 3) Implementation; and 4) Evaluation and documentation.

OBJECTIVES: The objectives of this program are as follows: To demonstrate and evaluate a multi-materials source separation program in an urban area. To document the demonstration and facilitate information transfer to other communities across the country.

In accomplishing the objectives outlined above, the program will demonstrate alternative source separation techniques, collection methods using a compartmentalized vehicle, and innovative methods of developing public participation in the program. It is anticipated that the results of this demonstration program will be of considerable benefit to other municipalities across the country, and that the techniques developed can be directly transferred to other source separation programs.

STATUS

N/A

INFORMATION/CONTACT

D. Reilly
Somerville City Government
City Hall
Somerville, Massachusetts 02143

III. AGRICULTURAL

PROJECT/TITLE

Demonstration of Facilities for the Treatment and Ultimate Disposal of Cattle Feedlot Wastes-Ultimate Disposal of Cattle Feedlot Wastes

CITATION

N/A

ABSTRACT/SUMMARY

Objectives of the project are: 1) To determine the effects of feedlot runoff and manure loading rates on the chemical and physical properties of soil, on the quality of runoff from the disposal area and on corn forage yields. 2) To determine the most economical loading of feedlot wastes onto land compatible with pollution control. 3) To determine the concentration of diethylstilbesterol residue in feedlot wastes and its movement through the soil profile beneath the waste disposal area.

STATUS

Project will be continuing for approximately 6 months. Several publications are available upon request.

INFORMATION/CONTACT

H. L. Manges
Kansas State University
School of Engineering/Anderson Hall
Manhattan, Kansas 66502
(913) 532-5580

PROJECT/TITLE

Pollution Control Systems for Beef Cattle and Sheep

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is the abatement of pollution through improved systems for controlling beef cattle and sheep waste. Systems for managing wastes from housed and feedlot beef cattle and sheep will be developed and evaluated for economic abatement of air, water and soil pollution. Permanent effluent land irrigation installations will be designed for disposal or utilization runoff from a beef feedlot holding pond to complete a total feedlot runoff control system. Attention will be given to developing improved handling systems for managing the solid waste. Units will be managed, tested and improved as necessary for system optimization. The components of collection, treatment, transport and disposal will be included in the design systems. Disposal of treated effluent to land will be investigated to develop application rates for optimum crop use.

STATUS

Completed, awaiting publishing.

INFORMATION/CONTACT

Conray B. Gilbertson
U.S.D.A. Meat Animal Research Center
Clay Center, Nebraska 68933
FTS 402-475-3669
(402) 472-2824

PROJECT/TITLE

Evaluation of Components and Systems for Handling Waste From Housed Swine

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is to reduce the pollution potential of housed swine through improved waste systems. Alternative methods of collection, treatment, transport and disposal of waste from housed swine will be developed and evaluated as component parts of a total system for economic reduction of the pollution potential of waste from all phases of swine production. Major components of systems will be evaluated, improved, and combined for development of optimum total systems. Evaluations will be based on labor, initial and operating costs, effects on livestock production, and degree of control over pollution of air, waste and soil.

STATUS

Completed-awaiting publishing.

INFORMATION/CONTACT

Conray B. Gilbertson
U.S.D.A. Meat Animal Research Center
Clay Center, Nebraska 68933
FTS 402-475-3669
(420) 472-2874

PROJECT/TITLE

Automated System for Water Pollution Control from an Animal Production Unit

CITATION

N/A

ABSTRACT/SUMMARY

The specific aims of the project were: 1. To continue to monitor with weekly sampling and laboratory analyses the overall performance characteristics of the plant. 2. To install, test and evaluate the performance of the aerobic digester equipment to be provided by DeLaval Company, or if not by them, to purchase and build a surface aerator for installation in the aerobic digester. 3. Surface aerator; submergence and speed variation in rotor; turbidity improvement of the effluent with the use of coagulants; evaluation of chlorine disinfection of the recycled effluent. 4. To automate the disposal of solids onto the nearby farm land with the used of automatically operated irrigation system. 5. To establish some monitoring stations for sampling and analyzing the water from the Loramie Creek that receives the drainage from the research farm of the Botkins Grain and Feed Company. 6. Develop an economic model of the plant to evaluate ways of making the system economically feasible.

STATUS

Completed.

The project was monitored for 3 yrs., and is reputedly the longest study of a project of this type. The report is well documented. The findings were presented in April, 1975 at a conference.

The report has been cleared for publication and is awaiting printing by EPA.

INFORMATION/CONTACT

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Agricultural Engineering
Ohio State University
School of Agriculture
190 N. Oval Dr., 102 Administration Bldg.
Columbus, Ohio 43210
(614)-422-6626

PROJECT/TITLE

Sulfur Application for Land Pollution Abatement

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of the project is to investigate methods for using sulfur to stabilize tailing piles to assure long-term resistance to weathering and to determine the applicability of sulfur for constructing impervious ground cover bases for sanitary landfill, leach dumps, and mill ponds.

The project is an ongoing one and has been in progress for over 14 years. The project is also aimed at cutting back on wind erosion by spreay coating to hold down various materials and prevent it from blowing away. Unusual success with uranium mill tailings has been demonstrated. Spray coating has played a very significant part in holding back radon gas.

STATUS

Ongoing project. Contact will research back for information pertaining to other projects that impact upon ground and surface water upon request.

INFORMATION/CONTACT

Donald G. Kesterke or Wm. McBee
U.S. Dept. of the Interior
Bureau of Mines - 500 Date Street
Boulder City, Nevada 89005

PROJECT/TITLE

Lake Hope Drainage Demonstration Project

CITATION

N/A

ABSTRACT/SUMMARY

Description: The purpose of the Lake Hope project is to demonstrate the reduction of acid mine drainage pollution by the removal of coal refuse, and the construction of bulkhead seals to flood underground mine workings and thus prevent the formation of acid. The Lake Hope site was chosen for the demonstration project because acidic drainage from abandoned coal mines in the watershed above Lake Hope was severely restricted waste oriented activity in this prime recreational area. A total of 107 mine openings has been noted. The combined acid discharge from these openings is over 700,000 pounds per year. A multiphase mine drainage abatement demonstration program is recommended with major elements including: Removal and/or burial of coal refuse which was scattered throughout the area during active mining operations; sealing of about 50 mine openings.

STATUS

Several standard bulkheads, and one innovative, but not new, bulkhead were used. The dirt was stripped from the hillside at the site of the mine openings. A clay dam was constructed and the stripped dirt was used to re-cover the hillside, thus sealing in the acid mine leakage. It is expected that before the end of 1975, the engineering design phase will be completed. Fifty mines have been cleared of coal refuse and sealed to date.

A feasibility study is pending publication. EPA-R2-73-151 Lake Hope Drainage Demonstration Project.

INFORMATION/CONTACT

W.C. Roman
Division of Planning
Fountain Sq. 43224
(614) 466-2333

PROJECT/TITLE

Utilization of Animal, Crop and Processing Residues

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Investigate means and processes for obtaining greater utilization of animal, crop and food processing plant wastes by recycling, conversion and energy recovery techniques. Control and reduction of air, water and soil pollution would be a basic consideration.

APPROACH: Laboratory and field studies would be conducted on open field burning of crop residues and pyrolysis and incineration for any recovery; animal and food processing wastes would be examined for recycling to animal feeds; all types of wastes would be studied in soil plots for recovery of nutrients and encouragement of soil bacteria conversion to useable plant nutrients.

STATUS

N/A

INFORMATION/CONTACT

B. C. Horsfield - Agricultural Engineering
N. B. Akesson
G. E. Miller
Univ. of California
Agric. Experiment Station
Davis, California 95616

PROJECT/TITLE

Analysis of Alternative Dairy Waste Management Practices on the Cost Structure of Dairying in the Chino Dairy Industry

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine the economic viability of the dairy industry; specifically to examine the impact of environmental quality regulations on the cost structure of dairying in Chino.

APPROACH: Existing and potential dairy waste discharge regulations will be identified and evaluated. The economic engineering approach will be utilized to synthesize the long run average cost function for large scale specialized dairies. Existing and new technologies in both dairying and waste management will be considered. Future structural changes in the Chino dairy industry will then be examined and the associated impact on the regional economy appraised.

STATUS

N/A

INFORMATION/CONTACT

H. O. Carter   Agricultural Econ
H. F. Carman
S. C. Matulich
Univ. of California
Agric. Experiment Station
Davis, California 95616

PROJECT/TITLE

Water and Waste Systems for Countryside Living

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluate existing water and waste systems used in countryside living for their physical, economic and qualitative appropriateness. Develop alternative systems when existing ones are not adequate. Inventory technological requirements and develop appropriate economic solutions for rural recreation developmental efforts.

APPROACH: Analysis of Nebraska data will indicate current technical difficulties with water systems, waste disposal systems, and recreational development for countryside living. Data include: needs; soil moisture samples from waste systems for possible ground water contamination; and well construction methods related to adequate supply and contamination. Development of economically viable alternative solutions and/or modificatins for technical problems will be based on analyses results.

STATUS

A survey of planners, manufacturers, installers, and users of septic tank disposal systems in eastern Nebraska has been completed. Concrete or plastic septic tanks with concrete or plastic half-moon drain tiles in a gravel filled trench is a rather common form of waste disposal system in the countryside with estimated life of 10 years. Two mound disposal systems have been installed at private homes near Lincoln, Nebraska. One uses perforated rigid pipe for the disposal line and the other uses perforated flexible pipe. Both sites utilize the dosing and resting techniques for effective disposal. Instrumentation allows observation of the disposal bed and amount of effluent deposited in the diposal lines. Porous extraction cylinders have been installed at several locations around six disposal fields and at two depths to extract moisture samples from home waste disposal areas. The experimental sites are near Grand Island, Nebraska, in an area with a relatively shallow water table of about twenty feet. Samples of the ground water in this area indicate a nitrate-nitrogen level above U.S. Public Health standards. This septic tank disposal system project is part of a coordinated effort to delineate the extent and sources of this nitrate-nitrogen pollution. Moisture samples are obtained from the extraction tubes every two weeks and contents are chemically analyzed.

INFORMATION/CONTACT

D. M. Manbeck Agricultural Engineering
P. H. Gessaman
Univ. of Nebraska
Agric. Experiment Station
Lincoln, Nebraska 68508

PROJECT/TITLE

Utilization of Forest and Forest Products Residuals

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Convert forest slash, forest products manufacturing waste, non-commercial wood species, and non-wood fibrous material into building products by dry processes.

APPROACH: The potential for converting the raw materials will be studied by species, particle geometry, particle size, pH level, and specific gravity. Bonding resins will be studied by type and level with these raw materials for developing appropriate board strengths. Dimensional stability will be developed by the use of resins and other chemicals, heat treating, and oil tempering. Different treatments for imparting fire retardancy will also be part of the overall study. Molding techniques will be developed for manufacturing of building components of comminuted particles or fiber building panels composed of aligned flakes, particles, and fibers will be developed by means of electrostatic orientation. Such oriented products should meet or exceed the strengths of conventional wood products.

INFORMATION/CONTACT

T. M. Maloney
J. W. Talbott
Washington State University
School of Agriculture
Pullman, Washington 99163

PROJECT/TITLE

Alternate Methods of Manure Handling

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluate the performance of a long-term low cost manure storage facility. Determine the extent of possible pollutants in runoff from manure storage facilities. Determine current manure handling practices in Vermont and dairy farmer attitudes and expectations with regard to potential regulations on manure handling.

APPROACH: A shallow manure storage pit will be constructed at the UVM Animal Research Farm using crushed rock for the base. Ease of operation will be evaluated and changes made if necessary. The facility will be monitored with automated equipment to determine the quantity and quality of runoff waters. Chemical determinations will include solids, organic-N, inorganic-N, total-P and organic-C. A questionnaire will be sent to a random sampling of Vermont Dairy farmers. The questions will be designed to evaluate farmers' attitudes to possible new regulations and the range of manure handling systems being considered.

STATUS

N/A

INFORMATION/CONTACT

F. R. Magdoff Plant & Soil Science
A. H. Smith
G. D. Wells
Univ. of Vermont St. Agr. Col.
Agric. Experiment Station
85 S. Prospect St.
Burlington, Vermont 05401

PROJECT/TITLE

Animal Waste Treatment and Recycling Systems

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Evaluate and compare by modeling the technical and economic feasibility of alternate systems of animal waste management; study performance of various treatment systems on animal wastes and waste-water prior to disposal.

APPROACH: Five anaerobic and five aerobic lagoons to store and treat waste from dairy cattle and swine are being developed. Additionally, 6 model lagoons (anaerobic, aerobic, aerobic and aerated) will be utilized in conjunction with the lagoon systems. The operating efficiency (BOD and nutrient removal), of the lagoon will be evaluated. An economic-engineering model of waste disposal systems will also be developed and evaluated.

STATUS

Eight anaerobic lagoons, six aerobic lagoons, and three irrigation reservoirs to treat and store waste from dairy, beef, and swine research units have been built at various locations within MAFES system. Anaerobic lagoon systems removed 96% of BOD from waste from cage layer houses. Flush systems utilizing recycled lagoon effluent fairly efficient removing waste from houses. Methane gas collection study indicated the initial production of gas from heavily loaded dairy lagoon was 8.5 ft/lb. V.S. during summer, but less in cold fall weather. A three cell dairy lagoon system monitored since September 1972. Tests for COD, pH, DO, total count, total coliform, fecal coliform, fecal streptococcus, staphylococcus, salmonella, shingella were conducted. COD reduction efficiency of three cell system was 96.2% overall and 87, 58 and 32% for cells 1, 2, 3 respectively. Cell 3 had effluent of 186 mg/l while control stock pond had COD 47 mg/l. Study was conducted on dairy cattle holding lot to determine effect of dry scraped, domestic water rinse, and recycled water rinse from third cell of lagoon system on microflora or lot surface. Swab samples obtained from lot surface just after treatment and four hours post treatment indicated no survival of staphylococcus, salmonella, and shigella organisms on lot surface four hours post treatment. Coliform organisms per square inch lot surface decreased 98% in case of dry scrape and recycled rinse water but increased 2 to 14% when domestic rinse water was used, suggesting that domestic chlorinated water removed natural microflora competion.

INFORMATION/CONTACT

J. B. Allen Agricultural & Biological Eng.
D. S. Ramsey
M. V. Kennedy
Mississippi St. University
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102 Experiment Station Bldg.
Mississippi State, Mississippi 39762

PROJECT/TITLE

Treating Cattle Waste in an Anaerobic Lagoon on Organic Soils

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Study effectiveness of an anaerobic lagoon for treating beef cattle feedlot waste in an area with organic soil overlying limestone rock, sub-tropical climate and a controlled high water table; monitor effects on the surrounding ground water.

APPROACH: A lagoon (170 x 100 x 12 feet) will be used to treat waste from a 100 steer capacity concrete floor feedlot. Manure will be washed to the lagoon through a concrete gutter system. Tests wells will be located 25, 100 and 200 feet from 3 sides of the lagoon. Three wells (4, 12 and 20 feet deep) will be positioned at each location. Influent, lagoon, and test wells will be sampled periodically to measure water quality. The more important parameters to be measured include total solids, volatile solids, total soluble salts, COD, total and orthophosphates, NO(- over 3) and NH(3).

STATUS

Water samples were obtained from test wells around an anaerobic lagoon, reference wells 1 mile away, and the anaerobic lagoon during and following manure disposal. Manure washed into the lagoon came from finishing pens containing 84 steers fed for approximately 163 days. Near the end of the manure disposal priod on 3/20/74 lagoon water concentration of NH(3)-N, NO(3)-N, dissolved PO(4)-P, and chemical oxygen demand were 246, 3.43, 24.4, and 15,613 mg/l, respectively. Lagoon water concentrations of these assay components 6 months after manure disposal ceased were 90, 1.62, 10.1, and 615 mg/l, respectively. Increased concentration of NH(3)-N, dissolved PO(4)-P and chemical oxygen demand were observed in water samples from test wells 25 ft. from the lagoon but not in samples from wells 100 and 200 ft. from the lagoon. There was not an apparent difference in NO(3)-N concentration in water samples from any of the test wells.

INFORMATION/CONTACT

F. M. Pate
J. R. Crockett
Agric. Res. & Educ. Center
Belle Glade, Florida 33430

PROJECT/TITLE

Pilot Study of a Mechanized Composting System for Agricultural Wastes

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Develop alternate methods for utilization or disposal of livestock and poultry production wastes. Investigate applicability of these methods to particular livestock production units for the control and prevention of air and water pollution. Develop and investigate alternative uses for these abundant resources.

APPROACH: A pilot system will be designed and constructed to investigate the applicability of composting to the treatment of dairy production wastes. The waste material will be placed in a channel and stirred by an elevating mechanism. Supplemental aeration will be provided. Data will be collected on power requirements and the properties of the composted material. The effect of management techniques, feeding practices and climatic conditions on the operation of the system and the material produced will be monitored. Research on uses for this material will be conducted.

STATUS

Operation of the pilot-scale composting system has demonstrated its functionalism. Relatively minimal management skills are required to operate the system. Close attention to excluding excess moisture from the charge material must receive high priority. When bedding with sawdust, charge material moisture contents above 70% W.B. resulted in poor air diffusion and delayed the initiation of thermophilic composting. Air was supplied through the channel floor at 0.13 scfm/ft of waste material. An economic analysis of the system indicated that with an initial investment of $17,500, composted dairy manure can be produced at less than $3.50/yd. The material is appealing to urban homeowners and gardeners and can be produced at a cost that is competitive with other similar or substitute products already marketed. Compost that had been sun dried was used as bedding in a 40-stanchion barn in a 13-day test period following a week preliminary period. The cows were rated for cleanliness daily on a 1 (clean) to 5 scale. The cows were as clean (2.366) when bedded with compost as with shavings (2.680). of the 34 cows that completed both periods, 20 were cleaner when bedded with compost and 12 were less clean (2 the same).

INFORMATION/CONTACT

J. W. Hummel	Agricultural Engineering

J. H. Vandersall
L. S. Bull
Univ. of Maryland
Agric. Experiment Station
College Park, Maryland 20740

PROJECT/TITLE

The Development & Assessment of Strategies for Firing Corp Wastes in Minnesota

CITATION

N/A

ABSTRACT/SUMMARY

Information will be accumulated concerning the following:

1. Major sources of crop residue in Minnesota along with their energy potentials, availabilities and costs.

2. Current practice and available equipment for on-site collection and for shredding.

3. The location of residue sources with respect to existing or proposed power plants, rail lines, highways and rivers.

4. Operations Research models for plant location and network synthesis. The above information will be assembled into a general flow model format able to trace the paths of residues from their points of generation through local collection, shredding and transport to power plants. This format will be sufficiently general to depict many possible strategies through the addition/deletion of certain elements and parameter changes. Associated with each strategy will then be a network of generation points which may tranship via one or more transfer depots to the power plants with shredding and/or other activities possibly taking place at each point. The operation of such a network will result in an energy use and dollar cost, both of which then characterize the particular strategy.

The computerized display scheme will be constructed, able to show an accounting of the dollar and energy use for each activity in a strategy. This computerized accounting scheme, combined with the generality of the flow model, will alow a variety of proposed strategies to be quickly analyzed in order to determine those which consume the least energy and dollars.

STATUS

N/A

INFORMATION/CONTACT

P. J. Starr Mech. Engin
Univ. of Minnesota
School of Engineering
105 Morrill Hall
Minneapolis, Minnesota 55414
(612) 373-2993

PROJECT/TITLE

Small Scale Crop Residue Pyrolysis System

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of the proposed research is to experimentally investigate the behavior of a small scale crop residue pyrolysis system. The tar produced under various operating conditions will be collected and weighed and its properties as a fuel evaluated. The yield of gaseous pyrolysis products, in particular, hydrogen, will be measured using a gas chromatograph. The char remaining after pyrolysis will be collected and weighed. Its value as a fertilizer will be assessed by scientists at the University of Minnesota College of Agriculture.

In a small experimental pyrolysis system crop residue samples will be fed to heated rollers. The volatile materials produced as the residues pass between the rollers are carried away through an exhaust duct. Noncondensible pyrolysis products will be analyzed by sampling the gas leaving the cold trap. Solid charred residues will be collected as they leave the rollers. The rollers will have thermocouples embedded in their surfaces for temperature measurement. A thermocouple system will be enclosed in an airtight box and continuously flushed with nitrogen. This will prevent oxygen from interferring with the pyrolysis process.

The effect of three variables on tar and hydrogen yield will be explored initially. These variables are roller temperature, feed rate, and spacing. Other variables which appear to be important will be explored in the course of the research. The ultimate objective of the research will be to find the optimum operating conditions for such a system, and based on its performance under these conditions, determine the feasibility of and design parameters for a full scale version of the system.

STATUS

N/A

INFORMATION/CONTACT

D. B. Kittelson Mech Engin.
T. E. Murphy
Univ. of Minnesota
School of Engineering
105 Morrill Hall
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(612) 373-2989/3009

PROJECT/TITLE

Energy Recovery Through Anaerobic Digestion of Animal Manure

CITATION

N/A

ABSTRACT/SUMMARY

An existing digester tank on a local swine farm receiving waste from about 250 hogs will be modified to provide mixing and heating to enhance the biological population within the digester. The digester will be monitored to evaluate the best way to feed and maintain the digester. Gas production and composition, pH, solids, feed rate and volatile acids will be parameters followed. The field study will be carried out under the adverse conditions of cold weather, farm animal production constraints and non-technical daily operation. Observations of how the reactor performs and problems that arise will yield information on how to fit reactors into a waste management system.

Swine waste from the site of the field unit will be brought into the laboratory and fed to bench scale digesters. These digesters will be fed at different rates and under different mixing regimes to measure performance and gas production. Gas composition and production will be sampled weekly as well as pH, alkalinity, total solids, total volatile solids and chemical oxygen demand.

STATUS

N/A

INFORMATION/CONTACT

P. R. Goodrich Agricultural Engineering
J. A. Moote
Univ. of Minnesota
School of Agriculture
105 Morrill Hall
Minneapolis, Minnesota 55455
(612) 373-0764/1343

PROJECT/TITLE

Chemical Processing of Feedlot Manure

CITATION

N/A

ABSTRACT/SUMMARY

Description: The economic feasibility and potential applications for producing synthesis gas (a mixture of CO and H(2) from cattle feedlot manure via fluidized bed pyrolysis was studied. An estimated 10.7 million standard cubic feet per day of synthesis gas could be produced by the conceptual design plant at a cost, including profit, of $0.85 per thousand standard cubic feet. Sensitivity analysis showed that production costs of the gas was affected by changes in plant capacity, incoming manure moisture content, and the cost of transporting manure from feedlots to the plant. Changes in chemical composition of the dry, ash-free manure had little effect on gas production costs. Based on the economic analysis and a survey of feedlot capacities in southwestern Kansas, the potential application of manure pyrolysis was studied. Plants processing up to 4.125 tons per day of dry manure could be supported with the cost of producing synthesis gas about $0.50 per thousand standard cubic feet. The gas could be used as a raw material and energy source for making up to 346,500 tons per year of ammonia or could be used to run electricity generating plants at up to 325 megawatts. The fluidized bed simulation unit was used to study elutriation of sand, manure, and ash particles in addition to observing the general operating characteristics of the bed. Both batch and continuous feeding experiments were conducted. Experimental elutriation rates were higher than predicted from existing correlations. The differences were explained by inaccuracies inherent in the correlations. The results were used to estimate ash build-up in the solids for a pilot scale gasifer which was found to be minimal.

Bibliographic references: Engler, C. R.; W. P. Walawender, L. T. Fan, "The Potential of Manure Pyrolysis for Ammonia Production and Electric Power Generation in Kansas", Report #61, Institute for Systems Design & Optimization, Kansas State University, Manhattan, KS, September 1974.

STATUS

N/A

INFORMATION/CONTACT

L. T. Fan Chemical Engin.
W. P. Walawender
Kansas State University
School of Engineering
Anderson Hall
Manhattan, Kansas 66502

PROJECT/TITLE

Waste Management in Housed and Outdoor Beef and Swine Feedlots

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Develop technology for collecting, handling, processing, transporting, utilizing, and storing animal wastes; minimize adverse affects on ground and surface water quality.

APPROACH: Engineering and chemical properties of beef and swine wastes will be developed to define probable waste-management systems approaches for outdoor and housed beef and swine feedlots. Dragline, oxidation ditches, and flush systems will be investigated for feasibility, component design, and management at the University of Nebraska Field Laboratory and selected cooperator sites. Materials-handling and processing techniques for liquid and solids handling, including physical, chemical, and biological treatment components, will be studied and systems for managing animal wastes developed. Coop. w/ARS, USMARC, Clay Center, Nebraska.

STATUS

N/A

INFORMATION/CONTACT

C. B. Gilbertson
J. A. Nienaber
T. M. McCalla
Univ. of Nebraska
U.S.D.A. Agric. Res. Service
Keim Hall, Room 331
Lincoln, Nebraska 68503

PROJECT/TITLE

Disposal and Utilization of Dairy and Poultry Manures by Land Application

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Develop and evaluate disposal and utilization systems for land application of treated and untreated dairy and poultry manure that will minimize the pollution of water, soil, and air.

APPROACH: Investigate losses of nitrogen and transformations in forms of nitrogen which occur during drying of poultry and dairy manure. Air velocity, temperature and humidity, size and shape of drying mass will be varied to achieve different drying times and conditions. Nitrogen could be conserved, removed or transformed depending upon the desired situation.

STATUS

Three tests have been completed on the deep pits which are under the slotted floors in a free-stall dairy barn at the T & R Center. Wood shavings used for bedding, were placed either in the stalls or directly on the slots in both the resting and feed alleys. Effective bedding rates varied from 0 to 10.4 lb. per 1000 lb. cow per day on the ash content of each pit, the animals deposited between 15 and 25 percent of the manure in the feed alley. Therefore, about 20 percent of the bedding should be placed in the alley. An effective bedding rate of about 3 lb. produced the most desirable results: amount of material to handle reduced by 50 percent, man-hours reduced 60 percent, weight per spreader load increased 25 percent and manure with bedding added is cleaner to handle and air pollution is reduced significantly. Nitrogen losses during storage are still too high.

INFORMATION/CONTACT

C. Ludington
Cornell University
Agric. Experiment Station
Ithaca, New York 14850

PROJECT/TITLE

Farm Animal Waste Management

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Improve the technology of composting animal manures as a method of stabilization which improves the acceptability of the manure for utilization and its handling and storage characteristics. Improvements in the process should enhance its agronomic value and reduce associated environmental and health hazards.

APPROACH: Conduct laboratory studies to identify processing conditions that influence nitrogen transformations during the process so that nitrogen losses can be minimized. Conduct pilot studies of processing procedures that would be adaptable for dairy farms and evaluate the procedures for economic feasibility, product quality, and control of process odors.

STATUS

Studies of the composting process for dairy manure were continued. Ammonia, nitrate, and total nitrogen contents were determined before and after composting dairy manure with several bulking agents. Two weeks of processing in bench composters usually reduced the ammonia content, in some cases as much as 90%. Nitrate contents usually remained about constant. Total nitrogen content expressed as a percent of dry matter usually increased moderately, reflecting more loss of volatile solids than nitrogen. Air pressure losses for forced aeration in composting manure increase with velocity at about the same rate as for stored grain.

INFORMATION/CONTACT

G. B. Willson
Univ. of Maryland
U.S.D.A. Shriver Laboratory
College Park, Maryland 20742

4. MINING WASTES

PROJECT/TITLE

Sulfur Application for Land Pollution Abatement

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of the project is to investigate methods for using sulfur to stabilize tailing piles to assure long-term resistance to weathering and to determine the applicability of sulfur for constructing impervious ground cover bases for sanitary landfill, leach dumps, and mill ponds.

The project is an ongoing one and has been in progress for over 14 years. The project is also aimed at cutting back on wind erosion by spray coating to hold down various materials and prevent it from blowing away. Unusual success with uranium mill tailings has been demonstrated. Spray coating has played a very significant part in holding back radon gas.

STATUS

Ongoing project. Contact will research back for information pertaining to other projects that impact upon ground and surface water upon request.

INFORMATION/CONTACT

Donald G. Kesterke or Wm. McBee
U.S. Dept. of the Interior
Bureau of Mines - 500 Date Street
Boulder City, Nevada 89005

PROJECT/TITLE

Lake Hope Drainage Demonstration Project

CITATION

N/A

ABSTRACT/SUMMARY

Description: The purpose of the Lake Hope project is to demonstrate the reduction of acid mine drainage pollution by the removal of coal refuse, and the construction of bulkhead seals to flood underground mine workings and thus prevent the formation of acid. The Lake Hope site was chosen for the demonstration project because acidic drainage from abandoned coal mines in the watershed above Lake Hope has severely restricted waste oriented activity in this prime recreational area. A total of 107 mine openings has been noted. The combined acid discharge from these openings is 700,000 pounds per year. A multiphase mine drainage abatement demonstration program is recommended with major elements including: Removal and/or burial of coal refuse which was scattered throughout the area during active mining operations; sealing of about 50 mine openings.

STATUS

Several standard bulkheads, and one innovative, but not new, bulkhead were used. The dirt was stripped from the hillside at the site of the mine openings. A clay dam was constructed and the stripped dirt was used to re-cover the hillside, thus sealing in the acid mine leakage. It is expected that before the end of 1975, the engineering design phase will be completed. Fifty mines have been cleared of coal refuse and sealed to date.

A feasibility study is pending publication. EPA-R2-73-151 Lake Hope Drainage Demonstration Project.

INFORMATION/CONTACT

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PROJECT/TITLE

West Shade River Abatement Demonstration Project

CITATION

N/A

ABSTRACT/SUMMARY

The concepts of sand abatement, strip-mine reclamation and mine-acid control are the objectives of the project. The demonstration project will seek to find how the use of sludge, fertilizing, liming and other minor techniques will permit the growth and self-regeneration of various grasses, shrubs and trees.

The demonstration project is being conducted in Meigs County, Ohio, which is a part of Appalachia. Severe erosion problems occurring in certain strip-mine areas can be eliminated or controlled utilizing methods and materials which have been researched. Sand erosion from high walls and spoil banks causes considerable property loss due to the deposition of sand over once-tillable soils and the clogging of existing waterways.

One of the problems encountered in this project is the distance from which the sludge had to be transported. The transportation of sludge from the waste treatment facility to the appalachian hills is expensive.

STATUS

A final report is pending.

INFORMATION/CONTACT

Appalachian Regional Commission or

C. Meir
State Department of Natural Resources
Columbus, Ohio 43212
(614) 466-3066

PROJECT/TITLE

Design Criteria for Mine Waste Disposal Systems

CITATION

N/A

ABSTRACT/SUMMARY

PURPOSE: Develop design criteria for stability and water-control analysis of M&NM tailings ponds; determine effect of water control on embankment stability and develop techniques for more effective control; determine seepage from tailings ponds into ground water by testing permeability, then devise ways to slow water loss.

STATUS

N/A

INFORMATION/CONTACT

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C. D. Kealy
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R. Busch
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Bureau of Mines
E. 315 Montgomery Ave.
Spokane, Washington 99207

PROJECT/TITLE

Treatment of Metallurgical Wastes - Recovery of Values From Secondary Metallurgical Materials

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: To develop practical innovative methods for treating metallurgical wastes resulting from the production and fabrication of metals and alloys, thereby facilitating the recycling or disposal of the remaining solids or liquids. Continue to develop and refine methods to recover metals and other valuable constituents of selected electrical discharge machining (EDM) sludges, grinding swarfs, and electroplating sludges containing significant tonnages of critical and strategic minerals. As the principal efforts demonstrate, on a large scale, the procedure developed for treating spent chromium etching solutions to recover chromium, copper, and zinc and producing a nonpolluting effluent fluid. Also, show the technical feasibility of recovering separately cadmium and zinc from waste cadmium-zinc electroplating sludges.

STATUS

N/A

INFORMATION/CONTACT

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L. C. George
W. E. Weber
O. K. Crosser
U. S. Dept. of The Interior
Bureau of Mines
P. O. Box 280
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PROJECT/TITLE

Safe Mine Waste Disposal

CITATION

N/A

ABSTRACT/SUMMARY

STATES TO WHICH PROJECT PERTAINS: Alabama, Georgia, Kentucky, Maryland, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia.

Environmentally acceptable disposition of deep mine waste and the development of surface mines for coal, require evaluation of slope stability. Completion of photo interpretation of slide prone areas and field check will be made in the area of the Canton, Clarksburg, Cumberland, and Columbus 1:250,000 maps. Final copies of the 7 1/2' field sheets will be open-filed. Work will be continued in the Huntington and Charleston map areas. In addition, measurements pertaining to the hydrology of areas susceptible to slides as well as in slide areas, clay mineralogy studies of slide material, and measurement of movement will be made at selected sites. Studies of appropriate aerial photo scales and criteria for recognition of slides and susceptibility to sliding will continue.

STATUS

N/A

INFORMATION/CONTACT

W. E. Davies
U. S. Dept. of The Interior
Geological Survey
12201 Sunrise Valley Dr.
Herndon, Virginia 22092

PROJECT/TITLE

Research and Develop Utilization and Disposal Methods For Coal Fly Ash

CITATION

N/A

ABSTRACT/SUMMARY

Research and development utilization and disposal method for coal ash produced by coal fired electric generating stations. This project includes, but is not limited to, the following: 1) Develop productive uses for coal fly ash in our service area. 2) Develop disposal methods for that portion of coal fly ash that cannot be utilized in productive ways.

STATUS

N/A

INFORMATION/CONTACT

R. W. Lappin
Okla. Gas & Electric Company
P. O. Box 321
Oklahoma City, Oklahoma 73101

PART III - LIQUID DISPOSAL

III. LIQUID WASTES DISPOSAL

A. MUNICIPAL

PROJECT/TITLE

Survival and Movement of Viruses in Landfilled Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this project are to determine the survival patterns of viral pathogens in landfilled solid waste and to evaluate the potential contamination of water resources through leaching of viruses from a waste disposal site. Microbiologic monitoring leachates from Cells #1 and #2 is being conducted in order to determine the degree of health hazard involved in solid waste disposal by landfilling. The results so far indicate that polio virus may survive in compacted solid waste for at least 13 days at temperatures of 68-80 degrees F but the virus is inactivated in 2-4 days in a landfill with temperatures ranging from about 120-140 degrees F.

STATUS

Publication pending.

INFORMATION/CONTACT

Merzda Peterson
Research Triangle Park
Durham, North Carolina 27709

PROJECT/TITLE

Investigation and Monitoring of Landfill Sites in Marion County, Ind.

CITATION

N/A

ABSTRACT/SUMMARY

This project was initiated as a result of the concern about ground water and surface water pollution originating at landfill sites in Marion County, Inc. Seven landfills were monitored and the results recorded (inorganic analyses, metal concentration, etc.). The project will be continued on a more detailed basis. The monitoring wells were used to gather data to define geology and the three dimensional ground water flow system and provided extensive water-quality information relative to this flow.

STATUS

The project has been completed and is now in the review stage.

INFORMATION/CONTACT

Bill Shampine or
Robert Pettijohn
U. S. Geological Survey
1819 North Meridan St.
Indianapolis, Ind. 46202
(317) 269-7101

PROJECT/TITLE

Snow Accumulation for Snow-Fence Experiments in Solid Waste Disposal Site Design

CITATION

N/A

ABSTRACT/SUMMARY

In 1974 a study was initiated to determine if it was possible to decrease the amount of snow held in solid waste disposal sites as one means of decreasing solid water moisture in the spring and early summer. The initial study involves the use of artificial barriers to induce additional accumulation of drifting snow away from the waste disposal site. If this additional snow were not held in the catchment area, it could add to the general infiltration in the waste disposal area.

Several working assumptions are used in the study; (1) drifting snow accumulates to significant depth only in places that are protected from the wind; (2) snow fills most terrain depressions before the end of winter, and once full, these areas are aerodynamically smooth and trap little additional snow; (3) artificial barriers of modest height combined with terrain features could increase the trapping efficiency of the natural terrain; (4) additional snow held in the catchment area could result in less snow accumulation and spring infiltration in the waste disposal site.

Two snow fields were selected for study. These were located in a large basin on the western side of a ridge in the town of Solon. It is expected that snow depth will increase close behind the fences but will decrease farther down-wind with no net increase in the amount of snow caught.

STATUS

The project is an ongoing one. Articles are available upon request.

INFORMATION/CONTACT

Dr. Je Bugh
State University of New York
Graduate School
Cortland, New York 13045
(607) 753-4214

PROJECT/TITLE

Hydrogeologic Considerations in the Siting and Design of Landfills in Kentucky

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of the project were to describe the geologic and hydrologic properties that should be used as a guide in selection of solid waste disposal sites. To select and describe geologic environments in Kentucky that would be suitable or unsuitable for solid waste disposal.

Knowledge of these properties is of value, not only for proper operation of the site, but also in reducing the pollution hazard to surface and ground water in the area. The general delineation of gelogic environments potentially suitable or unsuitable for refuse disposal in the state would provide information needed by state agencies involved in selection and approval of solid waste disposal sites.

STATUS

The project has been completed and is in review presently. The data can be used as a guide in the selection of solid waste disposal sites in other areas in the U.S. The transfer value is extremely good.

INFORMATION/CONTACT

H. H. Zehner
Water Resources Division
U. S. Department of The Interior
Geological Survey
Louisville, Kentucky 40202
(502) 582-5241

PROJECT/TITLE

Economic Analysis of Land-Intensive Wastewater Systems

CITATION

N/A

ABSTRACT/SUMMARY

The 1972 Water Pollution Control Act Amendments are requiring increased treatment of municipal wastewaters. One method to obtain a high quality effluent at relatively low cost compared to other techniques is land treatment.

This study compares and evaluates conventional in-plant treatment and land treatment in a cost framework and in a production efficiency framework. The major objective is to explain why more municipalities have not chosen land treatment in the past.

STATUS

Publication available.

Publication: Water Resources Research Institute of the University of
N. Carolina
UNC-WRRI-74-98 $4.00

Title: Economic Analysis of Land Treatment of Municipal
Wastewaters - G. A. Carlson
Article: Water Resources Journal (Date 1975)

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Water Renovation of Municipal Effluents by Reverse Osmosis

CITATION

J. E. Cruver, J. E. Beckman, and Bevege, Gulf Environmental Systems Company, San Diego, Ca.

ABSTRACT/SUMMARY

The purpose of the work performed under this contract has been to obtain reverse osmosis operating data on primary and secondary effluents with varying degrees of pretreatment. Field tests were conducted at the Pomona Water Renovation Plant of the County Sanitation Districts of Los Angeles. Two parallel reverse osmosis systems were operated with spiral wound membrane modules. It was concluded that spiral wound reverse osmosis units can be economically operated on primary and activated sludge effluents with only moderate pretreatment and periodic chemical cleaning. Activated-carbon pretreatment was shown to be unnecessary for successful operation on sand filtered activated sludge or chemically clarified and sand filtered primary effluent. A simplified economic analysis indicated that reverse osmosis treatment costs are favorable and that the process merits serious consideration in a planned water supply and waste management program.

STATUS

Publication Pending

INFORMATION/CONTACT

EPA
H. Bostian
(513) 684-8358
Cinn., Ohio 45213

PROJECT/TITLE

Reverse Osmosis of Treated and Untreated Secondary Sewage Effluent;
Appendix A-2 and Appendix A-6

CITATION

D. F. Boen, and G. L. Johannsen, Eastern Municipal

ABSTRACT/SUMMARY

The two appendices in this volume complete report "Reverse Osmosis of Treated and Untreated Secondary Sewage Effluent" EPA 670/2-24-077; the following abstract is that for the main volume. A pilot study was conducted to determine reverse osmosis feasibility on untreated and treated secondary effluents. Six commercially designed reverse osmosis pilot units, with 3,000 to 10,000 GPO nominal capabilities and different module concepts, were tested. Post treatment of secondary effluent feeds, using alum clarification sand filtration, granular activated carbon treatment, chlorine additions and pH adjustment, in different combination, improves reverse osmosis performance and significantly extends useful membrane rejuvenation treatments. Inorganic fouling (particularly with phosphate) could be removed with solution of the sodium salt of ethylenediaminetetraacetic acid. Of the module concepts tested, one of the tabular makes and the spiral wound had the best overall costs, excluding brine disposal, is estimated to be $0.73/1,000 gallons for 9 MGD product water facility.

STATUS

Publication available.

Main Volume: Reverse Osmosis of Treated & Untreated Secondary Sewage
Effluent, D. F. Boen

GPO-EP1.23/2:670/2-74-077 Price Pending
NTIS-PB 239353/AS $7.50

Appendix A-2 & A-6
NTIS-PB 239 354/AS $3.75

INFORMATION/CONTACT

G. Stern
(513) 684-8276
Environmental Protection Agency
Cinn., Ohio 45213

PROJECT/TITLE

Improved Waste-Treatment System Design Based on the Natural Thermal Environment

CITATION

N/A

ABSTRACT/SUMMARY

Low-maintenance, technology-simple (LMTS) waste treatment systems (systems having minimal dependence on electrical and mechanical equipment) offer an attractive alternative to technology-intensive, package plants currently being used to treat wastewaters from subdivisions and isolated recreational areas. Although package plants are advertised to perform satisfactorily with a minimum of operational control, experience has shown that they are subject to serious operational and performance problems.

The objective of the proposed research is to establish procedures with which the engineer can make a rational design of a LMTS waste treatment system based on (1) easily obtained meteorological data and (2) effluent standards applicable to the location of the system. This objective will be achieved by: 1. the definition and formulation of the time-varying thermal characteristics of that portion of the earth's surface extending from the surface to a depth of approximately 10 meters, 2. the characterization of domestic wastewater temperatures, 3. the application of recent research related to temperature effects on biological processes to the design of LMTS treatment units, and 4. the evaluation of the predicted characteristics of these units in light of current and anticipated effluent standards.

STATUS

Project ended June 76, waiting to be published.

INFORMATION/CONTACT

Dr. L. G. Rich
Clemson University School of Engineering
Rhodes Research Building
Clemson, South Carolina 29631
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PROJECT/TITLE

Effects of Spray Irrigation of Municipal Wastewater on the Rate and Total Accumulation of Heavy Metals

CITATION

N/A

ABSTRACT/SUMMARY

The specific objective of this project was to determine the total amount and rate of accumulation of selected heavy metals in several soil-vegetation ecosystems which were spray irrigated with treated municipal sewage effluent and sludge for twelve years. The proposed study was conducted at the Wastewater Renovation and Conservation Project Facility on the Pennsylvania State University farm where experimental plots were spray irrigated with various amounts and combinations of treated municipal sewage effluent and liquid digested sludge. The soil and vegetation in each area was sampled for analyses of selected heavy metals to determine the amount and rate of accumulation and to correlate these results with the application rates and vegetation cover types. Soil and foliar samples from previous years were analyzed.

STATUS

Completed.

Publication: Renovation of Secondary Effluent For Re-Use As A Water Resource
GPO-EP1.23/2:660/2-74-016 $4.80
NTIS-PB 234176

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Using Cropland for Sewage Wastewater and Sludge Disposal, W. E. Sooper

CITATION

N/A

ABSTRACT/SUMMARY

The objective was to determine the interaction of soils and plants with sewage wastewater and sludge disposed on cropland and forestland, with emphasis on P, boron, and N reactions in the soil and with the biosphere and on the soils potential for removing N from waste by removing denitrification; develop systems for land disposal of wastewater and sludge.

Hydrologic effects such as perched water tables, interflow and runoff were measured.

STATUS

Completed.

Publication: Conference on Recycling Treated Wastewater Through Forest and Cropland

GPO-EP1.23/2:660/2-74-003 $1.20
NTIS-PB 236313/AS

INFORMATION/CONTACT

N/A

PROJECT/TITLE

The Role of Sewage Effluent and Sludge in the Introduction of Mercury Into Marine and Agricultural Ecosystems

CITATION

N/A

ABSTRACT/SUMMARY

The proposed work will 1) determine the significance of mercury input into the estuarine environment by effluent and sludge disposal, 2) determine and explain the variations in mercury concentration observed in sewage treatment plants, 3) determine the input of mercury to the marine system by rain and runoff, 4) continue studies on the distribution of mercury in the local (Carteret County, North Carolina) estuaries comparing a system recieving effluent (Calico Creek, Morehead City, North Carolina) with a variety of less affected areas, 5) determine the rate of mercury accumulation in marine organisms which are fed on sewage sludge, 6) determine the rate of uptake of mercury by vegetables which are grown in soil enriched with sewage sludge. Coldvapor atomic absorption analysis of mercury will be used.

STATUS

The project is partially finished, and the investigators state that they have a pretty clear picture of the impact of mercury in the estuarine environment. Studies are being conducted at a small town Moorehead City treatment plant (15,000 pop.). Study has shown a very distinct pattern of mercury distribution in estuaries and animals. The distribution of mercury is very restricted in distance. It remains very close to the outfall of the sewage treatment plants.

A town of comparable size and adjacent to Moorehead has one half to one third less mercury in its effluent and sludge. There are no industrial sources in either town. It is presently theorized that the mercury contamination may have come from the use of house paints containing mercury. Fungi are a problem in the area and mercury was used as an inhibitor at one time. The contamination may be resulting from stormwater runoff.

INFORMATION/CONTACT

Dr. R. T. Barber
Duke University
Marine Lab
Beaufort, N. Carolina 28516
(919) 728-2111

PROJECT/TITLE

Management Practices Affecting Quality and Quantity of Irrigation Return Flow

CITATION

N/A

ABSTRACT/SUMMARY

Field and laboratory research was conducted to determine the effects of irrigation management and fertilizer use upon the quality and quantity of irrigation return flow. The total seasonal discharge of salts from the tile drainage system was directly related to the quantity of water discharged, because the solute concentration of the ground water was essentially constant over time. Under such conditions, reduction of salt content of return flow is accomplished by reduced drain discharge. Irrigation management for salinity control must be practiced on a major part of a particular hydrologic unit so that benefits are not negated by practices in adjoining areas. Field studies and computer models showed that salts may be stored in the zone above the water table over periods of several years without adversely affecting crop yields on soils with high "buffering" capacity as encountered in this study. However, over the long term, salt balance must be obtained. Appreciable amounts of nitrate into drainage water at depths of at least 106 cm from the applications of commercial fertilizer and adairy manure to ground surface. Submergence of tile drains in the field reduced nitrate concentrations in the effluent, especially under heavy manure applications. The report was submitted in fulfillment of Grant No. S801040 by Utah State University under the partial sponsorship of the Environmental Protection Agency. Work was completed as of November 30, 1973.

STATUS

Completed. EPA #660/2-75-005

INFORMATION/CONTACT

J. P. Law

PROJECT/TITLE

Bioconversion of Liquid and Solid Wastes to Fuels and Products

CITATION

N/A

ABSTRACT/SUMMARY

Description: We are developing two processes, the ANFLOW process, and the ALIC process, which can be used to convert various waste materials to fuels or to industrial intermediates. The ANFLOW process is an anaerobic packed-bed biological reactor process in which wastes are treated as they are pumped up through the packed bed. The ALIC process in an aerobic lignicellulosic waste degrading process. These processes can, either singly or together, be used to treat large numbers of wastes from processes such as cheese-making, coal liquifaction, solid waste treatment uranium processing, and film production. Domestic sewage can also be treated using these processes. Valuable industrial products, such as lactic acid, ethanol, methane, hydrogen sulfide, and fatty acids can be made using these processes.

STATUS

N/A

INFORMATION/CONTACT

W. L. Griffith
A. L. Compere
Oak Ridge Natl. Laboratory
P.O. Box Y
Oak Ridge, Tennessee 37830

B. INDUSTRIAL

PROJECT/TITLE

Solid Waste Management in the Industrial Chemical Industry

CITATION

Final report -- Holcombe, J. Kirby; Kalika, Peter W. Research Corp. of New England, Hartford, Conn.

ABSTRACT/SUMMARY

This report presents the results of a national study to evaluate the solid waste management practices of the industrial chemical industry, embodied by standard industrial classification (sic) number 281. Data and information on solid waste management within the industry were obtained through literature review, a questionnaire mailed to a selected group of industrial chemical plants, and field interviews with chemical plant personnel throughout the country. Presented in the report are the following information and data for the industrial chemical industry on a national basis: (1) quantity and quality (character) of solid waste generated; (2) universal parameters affecting solid waste generation; (3) current storage, collection, and disposal practices; (4) annual operating expenses; (5) analysis of the future trends in solid wastes management within the industry and factors that might influence them.

STATUS

Publication available from NTIS $6.25/MF $1.45

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Demonstration of Oily Waste Disposal by Soil Cultivation Process

CITATION

N/A

ABSTRACT/SUMMARY

The project consisted of a series of experiments on the treatment of oily sludges (crude tank bottoms, Bunker C, intermediate wax oils) by spreading and cultivation into soil under prevailing climatic conditions. Nine test plots were operated at specific nutrient addition levels. The objectives were to determine; (1) Decomposition rates of various types of oily waste sludges. (2) Effectiveness of adding nutrient supplements. (3) Major microbiological species active in the soil. (4) Cost of the process for the disposal of oily waste. (5) Depth of oil penetration into the soil. The demonstration phase followed a six-month pilot phase for optimization of waste loading rates and nutrient addition.

STATUS

The project was completed in 1973 after two years of testing. The results were presented at a conference in Atlanta, Ga. by Gordon Reno.
Pub: Oily Waste Disposal by Soil Cultivation Process--GPO EP1.23/2:
R2-72-110 $2.00
NTIS-PB 219059

INFORMATION/CONTACT

B. Baldwin
Shell Oil Company
Deer Park, Texas 77536
(713) 479-2311

PROJECT/TITLE

Phosphoric Acid Recovery System

CITATION

N/A

ABSTRACT/SUMMARY

This project is directed towards recovering acid and regenerating the processing solution of high acid content that is produced in bright aluminum processing. Lancy Laboratories has developed a process aiming for the separation of the acid and the aluminum content of the solution. This process promises an economical recovery of the acid and regeneration of the processing solution. Bright aluminum processing uses a solution of high acid concentration which loses its usefulness as the aluminum concentration increases.

The proposed concept has broad applications for treating waste process solutions used in the metal finishing industry. Successful demonstration of the process may have important environmental impact by significantly reducing chemical consumption and thereby reducing the waste sludges generated as well as the associated large land requirements for disposal.

Presently, 35% of the acid solution is sold to producers of fertilizer. The project is just starting up and is in the testing stage. Some laboratory data is available on request. Maximum recovery to reduce pollution is the primary goal.

STATUS

Project is on-going. Some publications are available upon request.

INFORMATION/CONTACT

Elbert Fang
EPA
Cleveland, Miss.

or

H. A. Lomason
Douglas & Lomason Co.
Detroit, Michigan 48208
(313) 873-2400

PROJECT/TITLE

Recovery of Chromic Acid and Nickel from Plating Waste

CITATION

N/A

ABSTRACT/SUMMARY

This project involves the demonstration of a metal finishing waste abatement system which consists of an integrated nickel and chromium chemical wash treatment, recovery of nickel from the nickel produced in the treatment process, recovery of chromic acid from the rinse and scrubber waters. The system permits the reuse of the bulk of the wastewater and the reduction of sludge.

The State of Michigan has the most stringent pollution codes in the U.S. Since the abatement system has been in progress, the plating effluent has been able to meet the State's water pollution codes. The demonstration system has been in operation for the past 2 years.

The recovery system is a very sophisticated and elaborate system whereby sludge is produced in cake form which is less bulky. The wastewater is precipitated, treated and discharged into the sewer.

STATUS

The domonstration system is an on-going project.

INFORMATION/CONTACT

C. W. Grose
Michigan Plating & Stamping Co.
740 Ann Street, NW
Grand Rapids, Michigan
(616) 363-4847

PROJECT/TITLE

Pollution Control in the Commercial Explosives Industry by
J. Patterson, Illinois Institute of Technology, Chicago, Ill.

CITATION

Same as Project/Title

ABSTRACT/SUMMARY

A literature and field study of the commercial explosives industry reveals that on the basis of products manufactured, plant size, and the nature of the wastewater, the industry may be divided into three segments. One, complex facilities, are large plants manufacturing a variety of explosives and intermediate products. The second category is small specialized formulation plants, typically limited to blending explosives formulations for use in nearby mining activities. The final category is specialty product facilities, devoted to manufacture of select ingredients such as lead ozide and other explosives initiators, blasting caps, electric matches and similar appurtenance items. The explosives industry discharges large volumes of wastewater, typically high in BOD, nitrogen, and solids, frequently at extreme pH, and containing trace to high quantities of dissolved and particulate explosives products. Although pollution abatement technology has not been widely implemented within the explosives industry, there is a potential for significant abatement of pollutant discharge by good housekeeping practice, application of proven treatment technology and under certain conditions total wastewater containment.

STATUS

Completed -- EPA #600/2-74-009b

INFORMATION/CONTACT

J. Patterson
Illinois Institute of Technology
Chicago, Illinois
(312) 567-3000

PROJECT/TITLE

Effluents of the Inorganic Pesticide Industry by J. Patterson,
Institute of Technology, Chicago, Illinois

CITATION

Same as Project/Title

ABSTRACT/SUMMARY

A literature and field study of the manufacture of inorganic pesticides revealed that many inorganic formuations are still widely used for agricultural purposes. The inorganic pesticide industry is a small by distinct segment of the total agricultural chemical industry. Its manufacturing processes and wastewaters contrast sharply with those assocated with organic pesticides. The inorganic pesticide market is dominated by eight products, each of which is discussed in this report with respect to its manufacturing effluent characteristics and applicable pollution control technology. Based upon field studies, it has been demonstrated that five of the eight products can be manufactured without generating any process wastewater. Aqueous effluents from the manufacture of the remaining three inorganic pesticides appear to be directly controllable by previously demonstrated in-plant control and/or wastewater treatment technologies.

STATUS

Completed -- EPA #600/2-74-009a

INFORMATION/CONTACT

DesRosiers
(202) 755-9014
EPA - Washington, D.C. 20460
Rm. 627 West Tower

PROJECT/TITLE

Waste Oil Recycling and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This publication contains information on the generation, collection and disposal of waste oil. It is a technical evaluation of current refining, and other disposal processes and an assessment (environmental) of the gaseous, liquid and solid wastes discharged from such processes. A feasibility test was conducted in a single metropolitan area for a survey designed to obtain information from service stations, waste oil collectors, and industrial users. The project also sought to obtain a national material balance to determine the ultimate fate of used oils.

STATUS

Project completed. Publication: GPO-EP1.23/2:670/2-74-052 $4.00
NTIS PB 234857/AS $6.50

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Activated Carbon Treatment of Unbleached Kraft Effluent for Reuse
E. W. Long, W. G. Timpe, and R. L. Miller, St. Regis Paper Co.,
Pensacola, Florida

CITATION

Same as Project/Title

ABSTRACT/SUMMARY

A four-year pilot plant program was carried out to investigate the technical and economic feasibility of treating unbleached kraft pulp and paper mill effluent for reuse. Preliminary laboratory studies and cost estimates indicated that the following treatment sequences should be investigated in the pilot plant: (1) primary clarification, carbon adsorption; (2) lime treatment, carbon adsorption; (3) primary clarification, bio-oxidation, carbon adsorption. Water of reusable quality can be provided from unbleached kraft effluent by several combinations of treatment utilizing activated carbon. Unbleached pulping effluents typically contain about 1000 color units, 250 mg/l BOD. Reusable water quality as defined in this study is 100 color units and 100 mb/l TOC. The most economical treatment is the microlime-carbon process that utilizes low dosages of lime and clarification followed by carbon adsorption in down-flow granular carbon beds. Capital cost for treatment by this process of 9.6 mgd of unbleached kraft effluent from an 800 ton perday mill was estimated to be approximately $6.7 million. Operating costs, inclusive of capital depreciation, were estimated to be $0.30 per 1000 gals. and $3.58 per pulp-ton, including credit for the reused water. Carbon adsorption in continuous counter-current stirred contractors was found to have promise of lower operating cost and substantially lower capital costs as compared to adsorption in fixed beds.

STATUS

Completed -- EPA #660/2-75-004

INFORMATION/CONTACT

J. Ruppersberger

PROJECT/TITLE

Effluents of the Inorganic Gas Industry, J. Patterson,
Illionis Institute of Technology, Chicago, Illinois

CITATION

Same as Project/Title

ABSTRACT/SUMMARY

A literature and field study of the inorganic gas industry revealed that the industry is dominated by (1) air separation plants producing argon, nitrogen and/or oxygen, (2) hydrogen plants and (3) carbon dioxide plants. The major effluent of the industry is cooling water, which may be contaminated with raw product condensates, oil, and grease and water supply and cooling water treatment chemicals. Spent scrubber solutions from product purification may also constitute a significant waste, although newer production technology eliminates this aspect, as well as oil and grease.

STATUS

Completed -- EPA #600/2-74-009c

INFORMATION/CONTACT

J. Patterson
Illinois Institute of Technology
Chicago, Illinois
(312) 567-3000

PROJECT/TITLE

Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Determine factors influencing maximum disposal rates consistent with soil, topographic and environmental conditions with emphasis on contamination of ground and surface waters. Determine factors influencing long-term utilization of wastes compatible with sustained agronomic production with emphasis on accumulation of toxic quantities of heavy metals in soils and plants.

APPROACH: Laboratory, greenhouse, and field studies will be used to evaluate the effects of soil texture, soil moisture, temperature, and loading rate on the decomposition rate of organic wastes in soils. Analyses of displaced soil solutions will characterize nitrogen transformations and the solubility changes in heavy metal actions. Accumulation of heavy metals in soils and plants will be investigated using appropriate analytical techniques.

STATUS

Studies were conducted on the accumulation of heavy metals in soils and in soybean and corn plants grown on a soil amended with low annual amendments of an anaerobically digested sewage sludge for about 19 years. Soils were sampled to a depth of 90 cm prior to the growing season. Analyses have not been completed to date, so that final conclusions cannot be drawn.

INFORMATION/CONTACT

R. H. Miller, Agronomy
Ohio State University
School of Agriculture & Home Economics
190 N. Oval Drive
102 Administration Building
Columbus, Ohio 43210

PROJECT/TITLE

Evaluation of the Health Effects of the Chemical Disposal of Pesticides and Pesticide Containers

CITATION

N/A

ABSTRACT/SUMMARY

To study the health aspects of chemical decontamination of empty pesticide containers and the chemical neutralization of excess pesticide formulations generated by routine pest control operations at Army installations and to develop guidelines for the use of chemical decontamination/neutralization techniques. The magnitude of the overall pest control program, including the large quantities of pesticide stocks required to operate it, the pesticide wastes generated by it, and the worldwide distribution of operations, makes this particular aspect of pesticide disposal unique to the Department of the Army.

Laboratory tests will be conducted to evaluate chemical treatment systems for organophosphate and carbamate pesticides. Health and environmental significance of reaction products will be evaluated by determining the known or suspected mammalian toxicity and toxicity to aquatic biota as reported in the literature, and by conducting screening aquatic bioassays.

INFORMATION/CONTACT

T. A. Miller
W. H. Dennis
U.S. Army
Bioengineering, Research &
Development Lab
Fort Detrick
Frederick, Maryland 21701

PROJECT/TITLE

Methods for Management of Waste Pesticides and Other Hazardous Materials

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Development of biologically based management systems for reduction of pesticide manufacturing waste as well as other pollutants. Determine the components needed for systems for collection, processing and decontamination of spent pesticide containers.

APPROACH: The basic strategy underlying the program will be to utilize the potential of the soil for biological and physical degradation of chemicals. Suitable land is avilable with low use potential and with geological features assuring restriction of chemical wastes to the site of application, providing air borne transport is adequately restricted. To be acceptable, any system developed must be proved capable of degrading a given chemical waste to non-toxic products within a useful time interval permitting re-application of additional waste or diversion of the land for other use. The product of two principal waste sources will be studied: (1) the by-products of pesticide manufacturing and formulating industries and; (2) the accumulations of containers generated by agricultural usage of pesticides. Solution of the latter problem requires decontamination and re-use or disposal of the containers as well as degradation of their unused residual content.

STATUS

Effects of processing spent pesticide containers in a drum reconditioning plant have been studied. Analytical work in the samples has been completed and data is currently being analyzed. Experiments on removal of pesticides from container rinse or wash waters significant reductions in concentration of representative organophosphates, chlorinated hydrocarbons, and phenoxy herbicides may be possible.

INFORMATION/CONTACT

R. L. Goulding
Oregon State University
126 Agriculture Hall
Corvallis, Oregon 97331

PROJECT/TITLE

Use of Industrial By-Products in Stabilized Roadbases

CITATION

N/A

ABSTRACT/SUMMARY

The object of the research is to study the possibility of using industrial by-products in road construction. During 1974: -- an inventory of industrial by-products will be made in the North East region of France; -- laboratory studies will be conducted of formulae for treating the clinker obtained from the incerations of household refuse and burnt shale from mines with standard binders (cement, fly-ash mixed with lime and granulated slag); -- laboratory studies will be carried out with a view to determining the possibility of re-using gypsum (by-product of the manufacture of phosphate acid) as accelerator in stabilized roadbases.

STATUS

N/A

INFORMATION/CONTACT

M. Bauchard
French Ministry of Equipment & Housing
Central and Regional Labs of Brgs.
58 Blvd, Lefebvre, Cedex 15
Paris, France 75732

C. AGRICULTURAL LIQUID WASTE

PROJECT/TITLE

Automated System for Water Pollution Control from an Animal Production Unit

CITATION

N/A

ABSTRACT/SUMMARY

The specific aims of the project were: (1) To continue to monitor with weekly sampling and laboratory analyses the overall performance characteristics of the plant. (2) To install, test and evaluate the performance of the aerobic digester equipment to be provided by DeLaval Company, or if not by them, to purchase and build a surface aerator for installation in the aerobic digester. (3) Surface aerator; submergence and speed variation in rotor; turbidity improvement of the effluent with the use of coagulants; evaluation of chlorine disinfection of the recycled effluent. (4) To automate the disposal of solids onto the nearby farm land with the use of automatically operated irrigation systems. (5) To establish some monitoring stations for sampling and analyzing the water from the Loramie Creek that receives the drainage from the research farm of the Botkins Grain and Feed Company. (6) Develop an economic model of the plant to evaluate ways of making the system economically feasible.

STATUS

Completed

INFORMATION/CONTACT

Dr. E. P. Taiganides
Agricultural Engineering
Ohio State University
190 N. Oval Drive, 102 Administration Bldg.
Columbus, Ohio 43210
614-422-6446

PROJECT/TITLE

Demonstration of Facilities for the Treatment and Ultimate Disposal of Cattle Feedlot Wastes - Ultimate Disposal of Cattle Feedlot Wastes

CITATION

N/A

ABSTRACT/SUMMARY

Objectives of the project are: (1) To determine the effects of feedlot runoff and manure loading rates on the chemical and physical properties of soil, on the quality of runoff from the disposal area and on corn forage yields. (2) To determine the most economical loading of feedlot wastes onto land compatible with pollution control. (3) To determine the concentration of diethylstilbesterol residue in feedlot wastes and its movement through the soil profile beneath the waste disposal area.

STATUS

Project will be continuing for approximately 6 months. Several publications are available upon request.

INFORMATION/CONTACT

H. L. Manges
Kansas State University
School of Engineering/Anderson Hall
Manhattan, Kansas 66502
(913) 532-5580

PROJECT/TITLE

Pollution Control Systems for Beef Cattle and Sheep

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is the abatement of pollution through improved systems for controlling beef cattle and sheep waste. Systems for managing wastes from housed and feedlot beef cattle and sheep will be developed and evaluated for economic abatement of air, water and soil pollution. Permanent effluent land irrigation installations will be designed for disposal or utilization runoff from a beef feedlot holding pond to complete a total feedlot runoff control system. Attention will be given to developing improved handling systems for managing the solid waste. Units will be managed, tested and improved as necessary for system optimization. The components of collection, treatment, transport and disposal will be included in the design systems. Disposals of treated effluent to land will be investigated to develop application rates for optimum crop use.

STATUS

N/A

INFORMATION/CONTACT

Conray B. Gilbertson
U.S.D.A. Meat Animal Research Center
Clay Center, Nebraska 68933
FTS 402-475-3669
402-472-2824

PROJECT/TITLE

Evaluation of Components and Systems for Handling Waste From Housed Swine

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is to reduce the pollution potential of housed swine through improved waste systems. Alternative methods of collection, treatment, transport and disposal of waste from housed swine will be developed and evaluated as component parts of a total system for economic reduction of the pollution potential of waste from all phases of swine production. Major components of systems will be evaluated, improved, and combined for development of optimum total systems. Evaluations will be based on labor, initial and operating costs, effects on livestock production, and degree of control over pollution of air, waste and soil.

STATUS

N/A

INFORMATION/CONTACT

Conray B. Gilbertson
U.S.D.A. Meat Animal Research Center
Clay Center, Nebraska 68933
FTS 402-475-3669
402-472-2874

PROJECT/TITLE

Water Pollution by Dairy Farm Wastes as Related to Method of Waste Disposal

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Relate criteria of water runoff from dairy farms employing various methods of waste disposal. Study significance of health-related microbes in dairy farm-fed streams in relation to method of waste disposal. Develop guidelines for controlling water pollution and undesirable odors caused by dairy farm waste. Determine economics of dairy waste disposal systems.

APPROACH: Examine existing waste disposal systems on selected Alabama dairy farms and study four methods of waste disposal at Alabama Agricultural Experiment Substations. Disposal of waste by the conventional, tank wagon, irrigation, and by the lagoon methods will be evaluated by water and soil tests in view of developing guidelines on acceptable waste disposal systems for dairy farms.

STATUS

Three field spreading methods and a lagoon system were evaluated for disposal of dairy-cow waste. Three rates of waste were applied to grassland plots by each of the field spreading methods for 27 months. Runoff water was collected from the plots, and from a check plot to evaluate runoff water quality. The scrape-haul method contributed more BOD load to runoff, and more fecal coliforms and nitrate to the soil than the irrigation or tank-wagon methods. The most BOD and nitrate in runoff during 1971 for all methods of field spreading waste occurred during August during which the rainfall was lowest for the year. The least BOD and nitrate in runoff coincided with the month of most rainfall (March). At 10 to 21 tons waste applied annually on grassland there was not an appreciable deterioration of runoff water quality nor buildup of soil nitrate. A two-stage lagoon system designed for 300 cu ft storage capacity per cow in the first stage and 643 cu ft capacity in the second stage for cows using milking facilitites reduced BOD, 95%, COD, 93%, Kjeldahl-nitrogen, 82%, and fecal coliforms, 99%.

For herds of 120 cows in confinement, the estimated annual cost per cow for manure management by the irrigation method was $30.31 and $24.07 for the scrape-haul method. The cost for systems that accomodated cows during milking was estimated at $11.24 per cow for the lagoon method and $21.21 per cow for the tank-wagon method.

INFORMATION/CONTACT

T. A. McCaskey
G. H. Rollins
Auburn University
Agricultural Experiment Station
Auburn, Alabama 36830

PROJECT/TITLE

Pyrolysis of Crop and Forestry Residues

CITATION

N/A

ABSTRACT/SUMMARY

DESCRIPTION: The project will investigate means of converting crop and forest residues into useful fuel materials by pyrolysis. The main emphasis of the research is on low temperature (250-300 degrees C) pyrolysis. Under these conditions the yield of tar should be maximized and the yields of solid char and gas phase pyrolysis products minimized. The effect of operations conditions on tar yield and the fuel value of the tar will be explored. The results will serve as data for design of such pyrolysis units.

ADDENDA: Estimated calendar year funding reported as 1974 $3,000, 11975 $21,000. This project is also supported by Minnesota Pollution Control Agency.

STATUS

N/A

INFORMATION/CONTACT

D. B. Kittelson
T. E. Murphy
University of Minnesota
School of Engineering
105 Morrill Hall
Minneapolis, Minnesota 55414

PROJECT/TITLE

Generation of Fuel Gas from Crop Residues and Other Agricultural Wastes

CITATION

N/A

ABSTRACT/SUMMARY

Bench scale studies of anaerobic digestion will be carried out on various agricultural and forestry waste materials. The objective is to obtain quantitative information on the rates of anaerobic decomposition, gas formation, and residual porducts, for various kinds of potentially useful wastes, and in various reactor configurations.

We have chosen to focus on two types of batch systems. (1) Single reaction vessel with mixing. These tests require a minimum of equipment and control. Periodic sampling of the gas and liquid phase will provide rate information and an estimate of the residue concentration and composition. Parallel tests using major crop residues such as corn stalks and straw will be carried out. Crop residues will be shredded to allow suspension in the digesters. (2) Compartmental reaction vessel systems with recirculation. Crop residues will be loaded into the first compartment of the vessel and leached continuously to stimulate decomposition and solubilization. Leachate from the first compartment will pass to a second compartment where conversion of the soluble substrates to methane will occur. Liquid from the second compartment will be partly recycled to the first vessel. This system requires a recirculating pump and low level of agitation. The crop residues will probably not have to be slurried but would have to be chopped into chunks of reasonable size to allow contacting with leaching solution.

The compartmental vessel system will be run on corn and soybean residues and possibly on wood chips. Gas and liquid samples will be analyzed. Residues will be tested for extended periods of time to determine their physical and chemical characteristics.

INFORMATION/CONTACT

W. J. Maier
A. G. Fredrickson
University of Minnesota
School of Engineering
105 Morrill Hall
Minneapolis, Minnesota 55414
373-2517

D. COMMERCIAL LIQUID WASTE

PROJECT/TITLE

Shrimp Canning Waste Treatment Study

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this project are: (1) Characterize physically, chemically and biologically the wastewater from a typical shrimp canning plant. (2) Measure the wastewater flows from a typical shrimp canning plant. (3) Evaluate and recommend changes in canning process operations to reduce wastewater flows. (4) Perform bench scale and pilot scale studies on shrimp canning wastes in order to develop design and operational criteria for selected treatment methods. (5) Determine the economics of various methods of solid waste disposal.

This project represents the initial stage of a continuing project. The next phase will involve the design of a wastewater treatment facility. The designing of the facility is expected to be completed by December, 1976.

STATUS

Preliminary Report

GPO-EP 1.23/2:660/2-74-061 $2.05
NTIS-PB 239 050/AS

INFORMATION/CONTACT

A. J. Szabo
American Shrimp Canners Association
P.O. Box 50774
New Orleans, Louisiana 70150
318-234-4566

E. INSTITUTIONAL LIQUID WASTES

PROJECT/TITLE

Waste Disposal Systems for Cold Regions

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of this project is to develop techniques and criteria for disposal of waste from military facilities, and for predicting, evaluating and controlling the effects of these waste on environmental quality in cold regions.

Major areas of research include treatment of wastewater by application to land as well as management of thermal and solid wastes. Significant aspects of the work with a final report will be issued upon completing of work in each problem area.

STATUS

Continuous project.

INFORMATION/CONTACT

Wesley Pietkiewicz
U.S. Army
Cold Regions Research and Engineering Lab
P.O. Box 282
Hanover, New Hampshire 03755
603-643-3200 ext. 243

PROJECT/TITLE

Annotated Bibliography on Hospital Solid Wastes Collection Treatment and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project consisted of compiling an annotated bibliography of the available literature on hospital solid waste collection, treatment, and disposal systems. Literature on microbiological or health aspects related to the various systems is included.

STATUS

The project is completed. Publications may be obtained from EPA (Publication EP #00458-02S1)

INFORMATION/CONTACT

Oscar Albrecht, Project Officer
Solid and Hazardous Waste Research Laboratory
National Environmental Research Center
Cincinnati, Ohio 45268

F. MINING LIQUID WASTES

PROJECT/TITLE

Availability of Mining Wastes and Their Potential for Use as Highway Material

CITATION

N/A

ABSTRACT/SUMMARY

This project shall consist of a survey and critical analysis of literature and information on mining and metallurgical wastes in the contiguous United States, with special emphasis on location, amount, composition, suitability, and potential as highway construction materials. It shall also include the development of recommendations as to the potential usefulness of those wastes which may require little or no upgrading, and the pinpointing of research needed to render other wastes suitable for use.

Document provided to S.S.I.E. by the T.R.A.I.S.

STATUS

N/A

INFORMATION/CONTACT

R. Collins
Valley Forge Laboratories Inc.
6 Berkeley Road
Devon, Pennsylvania 19333

G. MISCELLANEOUS LIQUID WASTE

PROJECT/TITLE

Application and Procurement of Automatic Wastewater Samplers by R.P. Lauch, Methods Development and Quality Assurance Research Laboratory, EPA Cincinnati, Ohio

CITATION

Same as above.

ABSTRACT/SUMMARY

Application and procurement of automatic sampling devices are discussed. Different sampler characteristics including composition proportionality, preservation, lift, and power are described. Manufacturers are listed. Application is discussed with reference to compliance with the National Pollutant Discharge Elimination System permit program, treatment plant control, and other uses. Method of selection and procurement (involving application, familiarization, and purchase) are discussed.

STATUS

Completed. (In-house project) 670/4-75-003

INFORMATION/CONTACT

EPA
R. P. Lauch
513-684-7322
Cinn., Ohio 45213

PROJECT/TITLE

Alternative Systems for Supplying Dissolved Oxygen in Wastewater Treatment by R. Smith and W.F. McMichael, Advanced Waste Treatment Research Laboratory, EPA Cincinnati, Ohio

CITATION

Same as above.

ABSTRACT/SUMMARY

Various alternative systems for supplying oxygen to wastewater treatment processes were studied and evaluated in terms of cost and effectiveness. Systems which deliver atmospheric air to the process such as diffused aeration, mechanical aeration, and turbine aeration are compared to systems which deliver pure oxygen gas. The relationship between oxygen consumption and excess sludge production in the activated sludge process is quantified. Factors such as the diurnal variation in oxygen demand and the oxygen demand as a function of distance along the aerator in the activated sludge process are studied. Finally, the total cost for oxygen supply expressed as cents per pound of oxygen dissolved in the wastewater is estimated as a function of total oxygen consumption expressed as tons of oxygen used per day. The least costly system was found to be mechanical aeration. The pure oxygen system was found to cost roughly the same as a diffused air system with an aeration efficiency of 54%.

STATUS

Completed -- EPA #670/2-75-001

INFORMATION/CONTACT

EPA
R. Smith
513-684-8352
Cinn., Ohio 45213

PROJECT/TITLE

Upgrading Wastewater Stabilization Ponds to Meet New Discharge Standards by E.J. Middlebrooks, D.H. Falkenborg, R.F. Lewis and D.J. Ehreth, Utah State University, Logan, Utah

CITATION

Same as above.

ABSTRACT/SUMMARY

The question as to whether lagoons, as they now exist, meet the new secondary treatment standards and what methods would work to upgrade lagoon treatment in cases where they presently do not meet the standards is of high priority for many Regional Offices of EPA. The symposium was held for EPA staff and State Officials to review the Office of Research and Development's program for upgrading lagoons. The intermittent sand filter, land application of algae laden effluents and the submerged rock filter offer good potential for cost-effective upgrading. The basic biology of the treatment mechanism, disinfection technology, the controlled discharge operation (and results), cost-effective analysis, and new fields of research were covered by speakers. Intermittent sand filtration, submerged rock filtration, and land application of sewage effluents are effective alternatives to removing algae from sewage lagoons.

STATUS

Proceedings from Symposium completed in 1974 -- EPA:PRWG 159-1

INFORMATION/CONTACT

E. J. Middlebrooks
D. H. FAlkenborg
Utah State University
Logan, Utah
801-752-4100

PROJECT/TITLE

Solid Waste Management Technology Assessment

CITATION

Boothe, W.A.; General Electric Corporate Research and Development, Schenectady, New York; December 74; 367p

ABSTRACT/SUMMARY

This report contains a thorough analysis of all the methods for processing and disposing of solid waste currently in use or being considered. It includes not only the conventional disposal processes such as land fill, composting, and incineration but also the newer resource recovery technologies such as pyrolysis, material and energy recovery which are now emerging from the laboratory. In addition to analysis of complete processes, discussions on the merits or key pieces of equipment such as shredders, air separators, and conveyors area also included. The analysis includes a description of the technical features of each process and how it works, a review of operating history and experience to date, and estimates of both capital and operating costs as well as scale-up considerations. Numerous tables are provided which allow ready comparison of competing processes in terms of net energy recovered, effluents, weight of materials to be land filled, etc.

STATUS

Publication available. NTIS PB-238 144/OSl

INFORMATION/CONTACT

N/A

RESIDUAL WASTE RECLAMATION

SECTION II

PART I	Sludge Disposal
PART II	Solid Disposal
PART III	Liquid Disposal

PART I -- Sludge Disposal

PROJECT/TITLE

Sludge Disposal from Sulfur Dioxide and Particulate Removal Processes

CITATION

N/A

ABSTRACT/SUMMARY

A study to summarize and evaluate existing data pertaining to sludge disposal. Investigate the potential methods for improving the characteristics of sludge, and recommend future testing required. The objective of the program is to evaluate the data which is available on sludge disposal and its properties so that a logical test program can be established. The scope of the program is to summarize and evaluate the available data to determine the program areas, to summarize and evaluate the methods for improving the characteristics of sludge, and to develop a test program for improving the characteristics of sludge. Existing data pertaining to sludge disposal is summarized.

STATUS

The paper study has been completed. A small pilot plant (1,000 lbs. per hr.) has been built, and produces a leachate from sludge which is being tested on a small scale vegetable farm. Good results have been attained, and trace elements and toxicity studies will be performed. The leachate is being used by fertilizer producers, also. Plant production will be increased to produce 3,000 lbs. of fertilizer.

INFORMATION CONTACT

B. McKinney or James Crow
U.S. Tennessee Valley Authority
Chattanooga, Tennessee 37402
(615) 755-3011

PROJECT/TITLE

A Color Removal and Fibrous Sludge Disposal Process for the Kraft Paper Industry

CITATION

N/A

ABSTRACT/SUMMARY

This publication discusses the development of an economical design and operational data applicable to the Kraft pulp and paper industry in removal of color in mill effluents and in disposal of fibrous sludges. Color removal was accomplished by lime precipitation of the color bodies and fibers with subsequent regeneration of the lime by sludge combustion in a kiln.

STATUS

Project completed. Publication: GPO-#P1.23.2:660/2-74-008 $1.65
NTIS-PB 235573/AS

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Reclamation of Metal Values from Metal Finishing Waste Treatment Sludges

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project was to develop information on sludge volumes and characteristics produced in metal finishing plants, determine the effects of weathering on sludges in current dispoal practice, and carry out bench scale investigations on potentially attractive techniques for recovering metals from these sludges. On the basis of the investigation, the process design and economics will be determined for selected metal recovery systems.

STATUS

Completed. Report EPA-#670/2-75-018

INFORMATION CONTACT

Ray Smithson
Battelle Memorial Institute
Columbus, Ohio
(614) 424-6424 ext. 2342

PROJECT/TITLE

Combined Sludge Processing Project

CITATION

N/A

ABSTRACT/SUMMARY

CCCSD has built an Advanced Treatment Test Facility (TTF) to treat raw sewage with lime followed by biological nitrification and denitrification at up to 2.5 MGD. The excess lime sludge is dewatered in a pair of centrifuges operated in series to separate calcium carbonate from calcium phosphate organic matter and inerts. Calcium carbonate is to be converted to recovered lime in one set of multiple heat furnaces and the residual sludge will be incinerated in another set of furnaces. This proposal documents the studies already carried out leading to the above conclusions and fills in engineering and analytical data necessary to make a complete report.

STATUS

Publication:	Sludge Processing For Combined Physical-Chemical-Biological Sludge GPO-EP 1.23/2:R2-73-250 $2.10 NTIS/PB 223 341

INFORMATION/CONTACT

P.H. Caldwell
Central Contra Costa Sanitation District
Walnut Creek, California

PROJECT/TITLE

Effective Utilization of Municipal and Utility Sludges and Ashes

CITATION

N/A

ABSTRACT/SUMMARY

The object of the project was to: (1) Perform a comprehensive literature review and survey of the present municipal and utility sludge and ash production, disposal methods and utilization methods. (2) Determine technical feasibility and economic practicality of more widespread application of present utilization methods. (3) Suggest new utilization methods with consideration of technical feasibility and economic practicality. A search of the literature and contact with a variety of governmental and trade organizations who are producers and/or present or potential users of sludges and ashes were conducted.

STATUS

Completed. Volume I -- EPA# 670/2-75-033 a, b, c, & d

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Fly Ash Filter Aid for Sewage Solids Dewatering and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project demonstrated the use of fly ash from a nearby power plant and sludge incinerator ash as filter aids in the pressure filtration of sludges. Pilot plant tests indicated that due to the nature of the sludge from the trickling filter plant other alternate methods of pretreatment would incur severe economic penalties. On the other hand the chemical ingredients in the fly ash and sludge incinerator ash, which are obtained at no cost permitted adequate dewatering at minimum cost. In addition, the trace minerals in the ashes and the plant food value from the sludge constituted a useable soil conditioner. The City of Cedar Rapids plans to utilize some of this sludge as a soil conditioner and fertilizer in their parks.

STATUS

Project completed -- Publication GPO-EP1.23/2:R 2-73-231 $2.10
NTIS-PB 223-535

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Demonstration of Oily Waste Disposal by Soil Cultivation Process

CITATION

N/A

ABSTRACT/SUMMARY

The project consisted of a series of experiments on the treatment of oily sludges (crude tank bottoms, Bunker C, intermediate wax oils) by spreading and cultivation into soil under prevailing climatic conditions. Nine test plots were operated at specific nutrient addition levels. The objectives were to determine; (1) Decomposition rates of various types of oily waste sludges. (2) Effectiveness of adding nutrient supplements. (3) Major microbiological species active in the soil. (4) Cost of the process for the disposal of oily waste. (5) Depth of oil penetration into the soil. The demonstration phase followed a six-month pilot phase for optimization of waste loading rates and nutrient addition.

STATUS

The project was completed in 1973 after two years of testing. The results were presented at a conference in Atlanta, Ga. by Gordon Reno. Pub: Oily Waste Disposal by Soil Cultivation Process
GPO EP1.23/2:R2-72-110 $2.00
NTIS-PB 219059

INFORMATION/CONTACT

B. Baldwin
Shell Oil Company
Deek Park, Texas 77536
(713) 479-2311

PROJECT/TITLE

Cost-Effectiveness Study for Handling and Disposal of Organic Sludges

CITATION

N/A

ABSTRACT/SUMMARY

The goal of this project is to develop mathematical model for all commonly used processes for sludge handling and disposal and to use these models in an Executive program which will size all processes and estimate the cost of the complete treatment train. Processes being considered are gravity thickening, air flotation thickening, centrifugation, anaerobic digestion, elutriation, aerobic digestion, vacuum filters, sand drying beds, multiple hearth incineration, and transport and disposal to land. A total of 181 ways have been identified to hand and dispose of both primary and waste activated sludge. Computation of the cost of these alternative processes will begin when models for aerobic digestion and land disposal have been completed.

STATUS

Completed. Proceedings of the National Conference on Sludge Disposal, August 1975, pages 30-60

INFORMATION/CONTACT

Richard Eilers or Robert Smith
NERC
5555 Ridge Ave.
Cincinnati, Ohio 45213
(513) 684-7624, 8352

PART II -- Solid Disposal

PROJECT/TITLE

Techniques for Disposal of Wastes from Fruit and Vegetable Processing Plants

CITATION

N/A

ABSTRACT/SUMMARY

Objectives: Evaluate methods for disposing or reducing saline wastes from food processing operations. Develop techniques for utilizing or reducing solid and liquid wastes from food processing plants. Determine whether pesticide residues, if present, can be reduced in or removed from food processing wastes.

Approach: The wastes will be subjected to separation, extraction of various components, dehydration or fermentation, submerged combustion, and other chemical treatments, where applicable. The main commodity wastes will include cucumbers, cabbage and tomatoes.

STATUS

Progress has been made in water reuse thereby reducing the total volume for disposal. Solid wastes are high in protein and have no antinutritional factors. Cucumbers cured in recycled brine were as good as or slightly better than those cured in fresh brine. Recycled brine was filtered and used for fresh pack pickles.

The final effluent is disposed of in lagoons. Spray irrigation of th effluent on fields is now being tested.

The project is just getting started with initial promising results.

INFORMATION/CONTACT

J.R. Geisman
Ohio State U. and Ohio Research & Development Center
20001 Fyffe Court
Columbus, Ohio 43210
(614) 422-5169

PROJECT/TITLE

Seafood Solid Waste in Oregon: Disposal or Recovery

CITATION

Special report: Kreag, Rebecca; Smith, Frederick J.

ABSTRACT/SUMMARY

The quantity and nature of seafood waste from processing operations are described. Ten alternatives to discharge directly into estuaries are presented. Three methods of disposal were studied for these wastes; incineration, barging off shore and landfill. Landfill appears to be the least costly and the most promising disposal alternative because of the limited quantity of wastes involved. Sever alternatives were considered for recovery of wastes for a marketable product: flesh for human consumption; fish protein concentrate; fishmeal; mink feed; fish food; fertilizer; and chitin for new special products.

STATUS

NTIS $3.00/MF $1.45 COM-74-11245/9

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Copper Recovery from Brass Mill Discharge by Cementation with Scrap Iron by P.O. Case, Anaconda Company, Waterbury, Connecticut

CITATION

Same as Project/Title

ABSTRACT/SUMMARY

This report presents the results of studies of copper recovery (and incidental reduction of hexavolent chromium) in brass mill discharge by passage of the discharge over scrap iron in a rotating drum. The drum feed consisted of normal production discharge of combined pickle rinse water and spent sulfuric acid and sulfuric acid-bichromate pickle. About half of the total mill waste discharge over a period of 16 weeks was processed. Four modes of drum operation were studied: (1) continuous rotation, (2) no rotation, (3) intermittent rotation (1 hr off - 5 min on), and (4) intermittent and two scrap iron surface area levels. Data were evaluated in terms of percent cementation of available copper, excess iron consumption over theoretical, and completeness of chrmoium reduction. Results indicate that the over-riding factor in the efficiency of copper cementation is the level of copper in the feed solution. Hexavalent chromium is effectively reduced providing the pH is below 2.5.

STATUS

Publication pending #670/2-75-029

INFORMATION/CONTACT

EPA
R. Tabakin
(201) 548-3414
Edison, New Jersey 08817

PROJECT/TITLE

Recovery of Chromic Acid and Nickel from Plating Waste

CITATION

N/A

ABSTRACT/SUMMARY

This project involves the demonstration of ametal finishing waste abatement system which consists of an integrated nickel and chromium chemical wash treatment, recovery of nickel from the nickel produced in the treatment process, recovery of chromic acid from the rinse and scrubber waters. The system permits the reuse of the bulk of the wastewater and the reduction of sludge.

The State of Michigan has the most stringent pollution codes in the U.S. Since the abatement systems has been in progress, the plating effluent has been able to meet the State's water pollution codes. The demonstration system has been in operation for the past 2 years.

The recovery system is a very sophisticated and elaborate system whereby sludge is produced in cake form which is less bulky. The wastewater is precipitated, treated and discharged into the sewer.

STATUS

The demonstration system is an ongoing project.

INFORMATION/CONTACT

C.W. Grose
Michigan Plating and Stamping Co.
740 Ann St; N.W.
Grand Rapids, Michigan 49504
(616) 363-4847

PROJECT/TITLE

Fly Ash Filter Aid for Sewage Solids Dewatering and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

The project demonstrated the use of fly ash from a nearby power plant and sludge incinerator ash as filter aids in the pressure filtration of sludges. Pilot plant tests indicated that due to the nature of the sludge from the trickling filter plant other alternate methods of pretreatment would incur severe economic penalties. On the other hand the chemical ingredients in the fly ash and sludge incinerator ash, which are obtained at no cost, permitted adequate dewatering at minimum cost. In addition, the trace minerals in the ashes and the plant food value from the sludge constituted a useable soil conditioner. The City of Cedar Rapids plans to utilize some of this sludge as a soil conditioner and fertilizer in their parks.

STATUS

Project Completed Publication
GPO-EP1.23/2:R 2-73-231 $2.10
NTIS-PB 223-535

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Solid Waste Management Technology Assessment

CITATION

Boothe, W.A.; General Electric Corporate Research and Development, Schenectady, New York; December 1974, 367 pages.

ABSTRACT/SUMMARY

This report contains a thorough analysis of all the methods for processing and disposing of solid waste currently in use or being considered. It includes not only the conventional disposal processes such as landfill, composting, and incineration but also the newer resource recovery technologies such as pyrolysis, material and energy recovery which are now emerging from the laboratory. In addition to analysis of complete processes, discussions on the merits or key pieces of equipment such as shredders, air separators, and conveyors are also included. The analysis includes a description of the technical features of each process and how it works, a review of operating history and experience to date, and estimates of both capital and operating costs as well as scale-up considerations. Numerous tables are provided which allow ready comparison of competing processes in terms of net energy recovered, effluents, weight of materials to be landfilled, etc.

STATUS

Publication available. NTIS PB-238 144/OS1

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Elimination of Water Pollution by Recycling Cement Plant Dusts

CITATION

N/A

ABSTRACT/SUMMARY

Objectives overall -- Elimination of problems associated with disposal of kiln dust from cement plants. Specifically by: (1) formation of clinker with concomittant violatilization of alkalies. (2) leaching of water soluble alkalies and return of leachate to system. (3) other uses of dust, fertilizer, soil stabilizer, or agricultural limestone. (4) use of dust as admixture to modify cement or cement products. Present approach -- Heat treatment of clay or shale fraction to remove alkalies from a portion of raw feed and/or to remove alkalie from total dust. Fluid bed furnace to remove alkalies at low temperature by control of the furnace atmosphere presently underway.

STATUS

The project is in the final writing stage. It was deemed somewhat successful by the investigators. Water soluble alkalies in cement dust were removed by flame-spraying.

Other phases of the project will continue until maximum results are gained. The project will be funded by private industry upon the exhaustion of governmental funds.

INFORMATION/CONTACT

Dr. Miller
Portland Cement Association
5420 Old Orchard Rd.
Skokie, Illinois 60076
(312) 966-6200

PROJECT/TITLE

Reclamation and Recycling -- An Economic Overview

CITATION

Schilling, Spencer, A., Bengston, Richard, J., and Lindholm, John W., Jr.

ABSTRACT/SUMMARY

It is sometimes assumed that the same technology that has created the wealth of products that we now throw away can create the means of reclaiming the valuable components in the wastes. Technology is needed, of course, but along with it must come new organizational structures that will encourage regional and State planning and operation of solid waste operations. One of the reasons that recycling is now so uneconomical is that depletion allowances and discriminatory freight rates encourage exploitation of virgin resources rather than reuse of secondary materials. Of the 260 million tons of wastes per year generated by residential, commercial, institutional, and manurfacturing establishments, about one third is recycled. Most of this reuse is in the production process itself, such as the return to the pulping process of paper broke. The real waste of resources occurs once the materials find their way into the heterogeneous waste collected by the municipal collection vehicle. Systems for relclaiming this waste exist; the reasons why recycling does not take place are not so much technological as they are economical and sociopolitical. The main economic difficulty is the lack of demand for recycled goods. Often the mills to make paper and steel are not close to urban centers, where the waste are, but close to coal or pulpwood supplies. Legal obstacles stand in the way of reclamation of junk cars; title procedures are long and involved and delay the return of the automobile to the production stream. A great deal of economic dislocation might result from recycling efforts; unemployment in primary resources industries is an example of one potential problem.

STATUS

Retained in SWIRS Library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Food Processing Wastes

CITATION

N/A

ABSTRACT/SUMMARY

This project dealt with the wastes generated by Oregon's primary food processing industry, and involved the evaluation of waste occurrence and waste disposal systems currently being used; estimation of the extent and seriousness of present and future problems; establishment of guidelines for the selection of research which could most reasonably help alleviate the critical pollution problems; and implementation of individual research projects involving waste reduction, waste treatment, and by-product development.

The end-of-pipe flows and the discharges from unit operations were monitored for flow, pH, temperature, settleable solids, turbidity, suspended solids, total solids, coliform, total coliform, fecal streptococcus, COD, POD and chemical concentrations. The results are expressed, where appropriate, as concentrations (e.g., mg U) and in terms of production (e.g., lb/T).

STATUS

Information and publications may be acquired from the Food Science and Technology Department, Oregon State University

Note: The effluents were tested through spray irrigation methods using "guess amounts", and results of the various concentrations were recorded. Concentration results are listed for each food processing industry.

INFORMATION/CONTACT

Mr. Soderquist
Food Science and Technology
Oregon State University
Corvallis, Oregon 97331
(503) 752-1141, 6719

PROJECT/TITLE

Flyash Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This project involved the disposal of flyash as a slurry in a worked out mine. The resultant mixture of slurry water and mine water were chemically treated before discharge to a stream. This project has been in existence for the past five years and is scheduled to continue for another 5 years.

The dissolved salts in the discharge has dropped from 3000 PPI to 2000 PPI to date. Research is continuing to reduce the salt content to 15 PPI or lower. The State of Pennsylvania treats the discharge as a process rather than a mine effluent. The present PPI would be allowable if the discharge was treated as mine drainage. However, the mechanism is working well and research will continue.

STATUS

Ongoing project. Information will be sent upon request.

INFORMATION/CONTACT

Mr. Robert O'Hare
Mr. Nelson Tonet
Duquesne Light Company
435 6th Avenue
Pittsburgh, Pa. 15219

PROJECT/TITLE

Fuel Gas Production from Solid Waste

CITATION

NSF Contract C-827 (covering the period: June 28, 1973 to December 31, 1974) Initiated June 28, 1973. Dynatech Report #1258. Prepared by R.G. Kispert, S.E. Sadek, L.C. Anderson, and D.L. Wise.

ABSTRACT/SUMMARY

The primary objective of this program is the development of a process for the economic production of pipeline quality fuel gas from the large organic fraction of municipal solid waste. As part of a continuing effort to find techniques for supplementing the natural gas resources in the United States, Consolidated Natural Gas Service Company, Inc., initiated at Dynatech R/D Company about four years ago, conducted extensive laboratory experiments on the anaerobic digestion of solid waste. As a result of these experiments, the feasibility of this gas production process has been demonstrated. The process has national applicability. Preliminary cost estimates based on a computer model developed at Dynatech for Consolidated indicated that large plants in metropolitan areas will produce fuel gas at an acceptable cost.

The program, funded by NSF/RANN, initially called for engineering analysis and computer optimization of the process on a production scale, followed by initiation of pilot plant work. Contract amendment No.1, April 9, 1974, changed the project objective to delete the design, procurement, and assembly of a pilot plant. Under this redirection the economic model of the process is to be confirmed and applied to analysis and review of the project performance of a full scale plant for the manufacture of fuel gas from solid waste. An added objective is the evaluation and specification of a proof-of-concept pilot plant.

STATUS

N/A Final Report -- NSF/RANN/SE/C-827/PR/74/5

INFORMATION/CONTACT

Dynatech R/D Company
99 Erie Street
Cambridge, Massachusetts 02139

PROJECT/TITLE

Institutional Barriers to Utilizing Solid Waste As An Energy Source

CITATION

N/A

ABSTRACT/SUMMARY

Study to identify, analyze and suggest policy initiatives to overcome institutional barriers that prevent solid waste from being utilized as an energy source, with primary emphasis in the area of utilities.

STATUS

N/A

INFORMATION/CONTACT

Gordian Associates, Inc.
711 3rd Avenue
New York, New York 10017

PROJECT/TITLE

Environmental Effect of Utilizing Solid Waste as Supplementary Power Plant Fuel

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project continuation is to develop the technologies in the utilization of solid waste as a fuel in combination with coal so as to provide guidance for energy recovery from solid waste in such a manner as to reduce the environmental impact of solid waste disposal and the emissions from coal-fired power plants.

The approach is to evaluate gaseous and particulate emissions, plus corrosiveness of the combustion products as a function of solid waste to coal ratio, and as a function of sulfur content of the coal. Also, refuse processing variables and methods of feeding refuse into the furnance will be evaluated. These various experimental parameters will be explored in an operating power station through the cooperation of the City of Columbus, Ohio.

During the first year, research methods were explored for feeding semi-and fully processed solid waste into the Columbus, Ohio, municipal light plant boiler furnaces using commercially available agriculture-type conveyors and blowers. Boiler tube corrosion data obtained when 15 and 35 percent refuse (Btu basis) was added to 3 percent sulfur coal, show no increase in corrosion rates at the 15 percent refuse level. Also, stack emission studies indicate a significant reduction in sulfur oxide emission when refuse is burned with high sulfur coal. Furthermore, examination of the ash revealed no unburned solid waste. It is planned to expand the program to longer term operations to permit confirmation of the above results and to determine the relative merits of higher refuse to coal ratios in terms of corrosiveness of combustion products, emission characteristics and combustion behavior. It is planned to replace the temporary refuse handling system with more rugged equipment for long-term operations.

INFORMATION/CONTACT

Battelle Memorial Institute
505 King Avenue
Columbus, Ohio 43201

PROJECT/TITLE

Solid Waste Utilization

CITATION

N/A

ABSTRACT/SUMMARY

An in-house study estimating the costs of converting oil-fired boilers to burn up to 20% solid waste in combination with oil has been completed. B&W is performing an engineering study to determine the cost of converting a specific boiler to partial trash combustion.

Objectives: To determine by 1976 the technical and economic feasibility of utilizing solid wastes by incineration or conversion to oil or gas fuel. In accordance with the SCE policy statement for solid waste utilization, research and development will perform preliminary technical and economic evaluations of any proposal submitted to SCE.

STATUS

N/A

INFORMATION/CONTACT

Babcock & Wilcox Company
P.O. Box 835
Alliance, Ohio 44601

PROJECT/TITLE

Solid Waste Utilization

CITATION

N/A

ABSTRACT/SUMMARY

The project has two objectives: (1) to improve present municipal solid waste disposal methods and benefit our urban environment; (2) to develop a locally produced fuel which can be used for electric power generation with minimal environmental impact. The Company's powerded fuel and cyclone fired boiler furnaces burned more than 18 million tons of coal in 1974. Using prepared municipal solid waste (prepared garbage) to replace 10% of the coal heat input will result in a significant decrease in sanitary landfill in our service area and a decrease in coal mining generally.

STATUS

N/A

INFORMATION/CONTACT

H.L. Koenig
Comm. Edison Company
3500 N. California Avenue
Chicago, Illinois 60632

PROJECT/TITLE

Technology for Use of Incinerator Residue as Highway Material

CITATION

N/A

ABSTRACT/SUMMARY

To develop the technology required for use of incinerator residues in various aspects of highway construction.

STATUS

N/A

INFORMATION/CONTACT

Valley Forge Laboratories, Inc.
6 Berkeley Road
Devon, Pennsylvanic 19333

PROJECT/TITLE

Utilization of Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

Utilization of Solid Waste -- Proposal Abstract: The objective of this research proposal is to develop a means of converting the combustible portion of municipal and industrial solid waste into a product suitable for transportation and combustion in a power generation facility. The proposed process would include shredding, magnetic separation of the ferrous metals, air or hydraulic separation of non-combustible portion of the waste and conversion of the combustible portion of the waste to a solid form. Funding and manpower given on this project include this project and project 6452, Project 6453 and Project 6455.

STATUS

N/A

INFORMATION/CONTACT

J.W. Moore, Civil Engineer
University of Arkansas
School of Engineering
Fayetteville, Arkansas 72701

PROJECT/TITLE

San Diego County Solid Waste Resource Recovery Project

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this project are (a) to demonstrate that the proposed integrated recovery process offers a superior technical, economic, and ecological method for disposing of 200 TPD of municipal solid waste from the City of Escondido and the City of San Marcos, California; (b) to show that the production of an industrial heating toil from municipal solid waste offers attractive possibilities for alleviating the nation's energy shortage, and that magnetic metals and a 99.9% pure glass cullet can be recovered for recycling into the economy; (c) to demonstrate the suitability of the process for conversion of special wastes such as used tires, animal waste, and sewage sludge into marketable products; (d) to identify those solid wastes which can produce char which is capable of being converted into a lost cost replacement form of powdered, activated carbon for the treatment of secondary sewage effluent and water filtration.

STATUS

N/A

INFORMATION/CONTACT

C.J. Houson
San Diego County Public Works Agency
San Diego, California 92123

PROJECT/TITLE

Investigate Synthetic Aggregate from Incinerator Residue by a Continuous Fusion Process

CITATION

N/A

ABSTRACT/SUMMARY

This project established the feasibility of converting municipal incinerator residue to synthetic aggregate for highway use by a continuous fusion process, and prepared a preliminary design for a full-scale production plant. Work is continuing.

STATUS

N/A

INFORMATION/CONTACT

D. Pindzola
Franklin Institute of State of Pennsylvania
20th and Ben Franklin Parkway
Philadelphia, Pennsylvania 19103

PROJECT/TITLE

Technology for Using Sulfate Waste in Road Construction

CITATION

N/A

ABSTRACT/SUMMARY

The Gillette Research Institute and the University of Virginia (as a subcontractor) are cooperating in a study of the chemical and engineering properties of lime fly ash-waste sulfate mixtures and lime fly ash-waste sulfate-soil and sewage sludge mixtures for use in highways as fill, subgrade, base course and aggregates for asphalt and Portland Cement Concrete.

STATUS

N/A

INFORMATION/CONTACT

H.G. Larew
F.C. McCormick
University of Virginia
School of Engineering and Applied Sciences
Garrett Hall
Charlottesville, Virginia 22903

PROJECT/TITLE

Utilization of Wood Residues for Highway Slope Stabilization in North Carolina

CITATION

N/A

ABSTRACT/SUMMARY

The objectives are (1) to develop the utilization of wood residues for highway slope stabilization in North Carolina; (2) to determine textural and bulk density optimums for various wood residues and optimum application rate to disturbed soils; and (3) to measure compatibility with seed emergence and subsequent cover growth. Full scale test plots are being used Statewide.

STATUS

N/A

INFORMATION/CONTACT

W.B. Gilbert
University of North Carolina
Highway Research Program
Raleigh, North Carolina 27600

PROJECT/TITLE

Efficiency of Shredded Hardwood Bark for Roadside Mulching and Erosion Control

CITATION

N/A

ABSTRACT/SUMMARY

This study was initiated for the purpose of establishing more precisely erosion control capabilities of shredded hardwood bark when used as a seeding mulch on freshly disturbed slopes similar to those encourntered on hgihway construction projects, and to determine to what extent these erosion control capabilities are affected by changes in the rates of application, and changes in the textural composition of the shredded bark mulches. The erosion control efficiencies of the various types of mulching media are to be determined under simulated conditions in a rainfall droptower where slope gradient and the intensity and length of exposure to which the slope models are exposed to rainfall can be controlled. The quantities of surface water runoff, soils and the quantities of mulching media eroded from the model surfaces, and the amount of water percolating down through the soil profile of the model are to be measured and are the variables that will be used to determine which media applied at what rates is the most effective mulching media. Measurements of these same variables, when the model is mulched with straw and emulsified asphalt are applied at the rate of two tons of straw and 200 gallons (760 dm 3) of asphalt per acre will be used as a standard for comparing the effectiveness of the bark materials. Three replications of test runs using shredded bark applied at 20, 30, 40, and 50 cubic yards (15, 30, 22, 95, 30.00, 28,25 h to 3rd power) per acre on two slopes (3:1 and 2:1) at two different rainfall rates (6" and 9"), 0.1524 m and 0.2286 m, per hour for 30 minutes) have been completed. Also sawdust applied at 30 and 40 cubic yards (22.95 and 30.00 m to the 3rd power) per acre and coarse and fine shredded hardwood bark mulching media have also been tested. Work with the straw and emulsified asphalt treatments are in progress and should be completed in December 1974. Preliminary examinations show that significant differences between the various types of mulches applied at different rates are being observed. It is hoped that a final report for this project can be completed by mid June 1975.

STATUS

N/A

INFORMATION/CONTACT

T.R. Yocum

University of Illinois
Graduate School
Urbana, Illinois 61801

PROJECT/TITLE

Improve Systems for Recycling Aluminum (old scrap)

CITATION

N/A

ABSTRACT/SUMMARY

Scrap aluminum can be recycled to the ingot stage for 5% of less of the energy to produce primary aluminum with savings in other resources. Problems of collecting the material and processing it into acceptable ingot are being worked on. In the collecting area, the problems are promoting compacting of cans by consumer, sorting aluminum from refuse, and developing tabless cans. In the processing area, the problems are removing contaminants, maximizing recovery in melting, and developing compatible alloys.

STATUS

N/A

INFORMATION/CONTACT

G.K. Turnbull
Aluminum Company of America
426 6th Avenue, 1501 Alcoa Bldg.
Pittsburgh, Pennsylvania 15219

PROJECT/TITLE

Waste Product Utilization

CITATION

N/A

ABSTRACT/SUMMARY

The utilization of waste products includes research in variety of product areas such as: (1) The use of bark as cattle fodder. (2) The use of bark as animal bedding. (3) The use of bark as a mulching agent. (4) The use of paper mill sludge as a base substance for manufacturing a variety of products. (5) The reclaiming of wood fiber from industrial waste. (6) The reclaiming of process water. (7) The recycling of waste papers. The first four product areas listed above have been completed with moderate technical success but were terminated because of poor economics. Reclaiming of wood fiber (#5) is in progress, while items #6 and #7 are expected to being in 1975.

STATUS

N/A

INFORMATION/CONTACT

S.G. Holt
Consolidated Papers, Inc.
P.O. Box 50
Wisconsin Rapids, Wisconsin 54494

PROJECT/TITLE

Scrap Tire Utilization

CITATION

N/A

ABSTRACT/SUMMARY

The overall objective is to develop an economical process for the disposal of scrap tires with an attendant savings of energy. The first specific objective was to pyrolyze scrap rubber to obtain three major products; light hydrocarbon gas, oil and a residue char. This objective was realized by pyrolysis of scrap rubber in a continuous process using a rotating calciner. The light hydrocarbon gas would be used as a fuel for the calciner; the soil carbon black feedstock or source of hydrocarbon resins. The residue char could be used as fuel, ground for carbon black application, or steam-treated to form activated carbon. A second objective was to convert scrap tires into a liquid product which could be utilized as a fuel, recycled back into rubber goods as a carbon black/oil mixture or a source of useful chemical products. The objective was realized by the dissolution of scrap rubber in oil using conventional chemical process equipment. Work is continuing toward finding other applications where scrap tires can ease the energy shortage.

STATUS

N/A

INFORMATION/CONTACT

G. Alliger
Firestone Tire and Rubber Company
1200 Firestone Parkway
Akron, Ohio 44301

PROJECT/TITLE

Refuse Burning Study for Centralia Power Plant

CITATION

"Solid Waste Study Report for Pacific Power and Light Company's Centralia Station" by J.F. Mullen, September 12, 1974

ABSTRACT/SUMMARY

This project was a study on the feasibility of burning shredded municipal waste in the boilers of a large coal fired steam plant. The study was conducted by the manufacturer of the boiler and involved: the determination of the effect of burning shredded refuse in conjunction with coal on unit performance; the determination of equipment necessary to handle prepared refuse at the plan site; determination of modifications to the stream generator and auxiliaries to accommodate refuse burning; determination of equipment location at the plant site; and determination of capital cost vs. fuel costs savings. The results indicated that burning shredded refuse in a large coal fired steam plant may be a feasible method of solid waste disposal.

STATUS

N/A

INFORMATION/CONTACT

J.F. Mullen
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

PROJECT/TITLE

Recycling of Used Packaging Materials

CITATION

N/A

ABSTRACT/SUMMARY

Objective: Find and develop economically viable uses for empty plastic bottles and other rigid plastic packages.

Approach: Known uses of specific materials will be investigated to find those which might be effectively produced from used empty packages at an economic advantage. Specific early investigations will include a study of the possibility of making polyethylene foams for protective packaging uses from empty detergent and milk bottles. Studies will also be made of processes which might return these materials to use in a longer term situation as building components such as drain pipe, architectural moldings and building panels.

STATUS

Studying problems associated with the degradability of plastics and its effects in the use of plastics. Report issued. Literature surveillance maintained.

INFORMATION/CONTACT

J.W. Goff
Michigan State University
Agricultural Experiment Station
New Administration Building
East Lansing, Michigan 48823

PROJECT/TITLE

Scrap Tire Pyrolysis Project for Recycle of Carbon Char and Oil

CITATION

N/A

ABSTRACT/SUMMARY

The project is a joint-venture with The Oil Shale Corporation of Los Angeles. The objective is to determine the economic feasibility of processing scrap tires through oil shale process equipment using oil shale process technology. Products will include substantial amounts of carbon char and oil. Once all pertinent data is gathered, commercialization will be considered.

STATUS

N/A

INFORMATION/CONTACT

V.A. Snow
Goodyear Tire and Rubber Company
1144 E. Market Street
Akron, Ohio 44316

PROJECT/TITLE

Energy and Resource Recovery From Municipal Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

Develop an economically viable process for recovery energy and glass, metals and other resources from municipal and industrial solid wastes. Develop preparatory pyrolysis processes for production of liquid and gaseous fuels from the organic portion of these wastes and proprietary froth-flotation process for glass recovery as well as a proprietary linear induction motor system for aluminum recovery.

STATUS

N/A

INFORMATION/CONTACT

D.E. Garrett
Garrett Research and Development Company, Inc.
1855 Carrion Road
La Verne, California 91750

PROJECT/TITLE

Recovery of Energy from Agricultural and Timber Waste Residue

CITATION

N/A

ABSTRACT/SUMMARY

An inventory of agricultural and timber waste residues is being made and schemes for collection and utilization including pyrolysis, anaerobic digestion and direct firing are being investigated. At the same time, a concurrent study hopes to assess the effects of soil properties of removing these wastes which are currently left on the land as soil amendment. (From the National Governors' Conference).

STATUS

N/A

INFORMATION/CONTACT

P.L. Blacksheer, Mechanical Engineer
University of Minnesota
School of Engineering
105 Morrill Hall
Minneapolis, Minnesota 55414

PROJECT/TITLE

Resource and Energy Recovery from Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

This study was undertaken to determine the feasibility of a solid waste disposal system utilizing an energy recovery process to produce steam or electricity. The study area is about 160 miles in length along the Oregon south coast and produces an estimated 300 tons per day of municipal refuse. Other wastes, including mill and logging wood residues were also considered. The study included (1) estimates of the waste types and quantities, projections and geographic distribution; (2) descriptions of suitable processing and energy recovery plant alternatives; (3) development of a planfor transfer/transport facilities; (4) evaluation of markets and estimates of prices for steam and electricity; (5) a survey and identification of environmental and technical factors on several potential plant sites; and (6) a series of detailed economic evaluations of the system costs and disposal cost for comparison with conventional land fill disposal.

STATUS

N/A

INFORMATION/CONTACT

R.D. Schilling
CH2M Hill Incorporated
P.O. Box 428
Corvallis, Oregon 97330

PROJECT/TITLE

Secondary Resource Recovery

CITATION

N/A

ABSTRACT/SUMMARY

Since November 1969, a pilot plant has been operated to separate minerals and metals from municipal incinerator residues. Cost estimates for commercial-size plants show favorable economics. A demonstration plant, based on this flowsheet, is being built at Lowell, Massachusetts, funded in part of E.P.A. Under a cooperative agreement with the contractor, Raytheon Service Company, technical assistance is being provided by the Bureau of Mines to assure that the plant will be both a technical and economic success.

Another pilot plant has been assembled to reclaim values from raw urban refuse. This plant has been operating since early 1973 and reclaims iron, glass, nonferrous metals, and combustibles. Early results are extremely encouraging and preliminary cost evaluations show favorable economics. Major emphasis is currently being placed on determining the most effective combination of the various unit operations that have proved successful in making the required separations.

INFORMATION/CONTACT

P.M. Sullivan
H.V. Makar
U.S. Department of Interior
Bureau of Mines
College Park, Maryland 20740

PART III -- Liquid Disposal

PROJECT/TITLE

Techniques for Disposal of Wastes from Fruit and Vegetable Processing Plants

CITATION

N/A

ABSTRACT/SUMMARY

Objectives: Evaluate methods for disposing or reducing saline wastes from food processing operations. Develop techniques for utilizing or reducing solid and liquid wastes from food processing plants. Determine whether pesticide residues, if present, can be reduced in or removed from food processing wastes.

Approach: The wastes will be subjected to separation, extraction of various components, dehydration or fermentation, submerged combustion, and other chemical treatments, where applicable. The main commodity wastes will include cucumbers, cabbage and tomatoes.

STATUS

Progress has been made in water reuse thereby reducing the total volume for disposal. Solid wastes are high in protein and have no anti-nutritional factors. Cucumbers cured in recycled brine were as good as or slightly better than those cured in fresh brine. Recycled brine was filtered and used for fresh pack pickles.

The final effluent is disposed of in lagoons. Spray irrigation of the effluent on fields is now being tested.

The project is just getting started with initial promising results.

INFORMATION/CONTACT

J. R. Geisman
Ohio State University and Ohio Research & Development Center
20001 Fyffe Court
Columbus, Ohio 43210
(614) 422-5169

PROJECT/TITLE

Demonstration of Oily Waste Disposal by Soil Cultivation Process

CITATION

N/A

ABSTRACT/SUMMARY

The project consisted of a series of experiments on the treatment of oily sludges (crude tank bottoms, Bunker C, intermediate wax oils) by spreading and cultivation into soil under prevailing climatic conditions. Nine test plots were operated at specific nutrient addition levels. The objectives were to determine: 1) Decomposition rates of various types of oily waste sludges; 2) Effectiveness of adding nutrient supplements; 3) Major microbiological species active in the soil; 4) Cost of the process for the disposal of oily waste; and 5) Depth of oil penetration into the soil. The demonstration phase followed a six-month pilot phase for optimization of waste loading rates and nutrient addition.

STATUS

The project was completed in 1973 after two years of testing. The results were presented at a conference in Atlanta, Georgia by Gordon Reno.
Pub: Oily Waste Disposal by Soil Cultivation Process-GPO EP1.23/2:R2-72-110
NTIS-PB 219059 $2.00

INFORMATION/CONTACT

B. Baldwin
Shell Oil Company
Deer Park, Texas 77536
(713) 479-231

PROJECT/TITLE

Industrial Chemicals Solid Waste Generation. The Significance of Process Change, Resource Recovery, and Improved Disposal.

CITATION

Final rept. Saxton, James C.; Kramer, Marc. Arlington, Va. 6/74 155.P

ABSTRACT/SUMMARY

The study characterizes the process-related solid wastes produced during manufactures of industrial chemicals, Sic group 281. Thirty-three chemicals were selected that: possess significant resource value, pose a difficult solid waste disposal problem, and/or have markedly deleterious properties, e.g., toxicity. The selected chemicals composed 40 percent of 1971 group output and an estimated 95 percent of the group's solid waste. Fifteen of the chemicals are undergoing process substitutions; in every case the newer process generates less solid waste. Most of wastes are of intrinsically low value, so resource recovery is seldom economic. Inorganics account for over 90 percent of total disposal cost, due to large waste volume from cre-related processes, such as alumina and phosphoric acid. Organics appear to pose little disposal problem. Elimination of water discharge doubles the disposal cost of the 33 chemicals.

STATUS

Available from NTIS Pb-233 46417 pc $5.00/MF $2.25

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Closed Process Water - Loop in NSSC Pulp Production

CITATION

N/A

ABSTRACT/SUMMARY

The project objective is to accomplish the maximum closure of the water use loop in an integrated neutral sulfite semichemical pulp and paperboard mill by: recycling contaminated process waters for direct reuse; providing a protective collection and surge system for excess surge volumes occurring during process upset conditions; providing a reverse osmosis plant to separate dissolved constituents from such excess volume as occurs, recycling the permeate so produced to replace fresh water. The separated dissolved solids will be destroyed in an existing fluid bed combustion system. A second objective of the project is to demonstrate the important results of operating with the tightly closed system on the production of NSSC paperboard. Effective techniques derived to identify and cope with problems of high dissolved solids and high temperature in the papermaking process will be developed over a year's operation of the proposed facility integrated with regular mill operations. The required techniques to stabilize operations and control ambient paper machine conditions have not yet been demonstrated in the paperboard industry.

STATUS

The project will terminate in August, 1975 after a six-month extension due to problems encountered in the reverse osmosis system. As far as closure is concerned, the project has been successful in that the BOD suspension was low in cost. However, water removal and water balance has been a problem in the reverse osmosis process due to the removal of excess water from spasmodic events (snow, machine breakdown, etc.).

The permeate was relatively pure with the exception of acid considering tha fact that there are 27 paper mills and four large communities upstream from the Fox River. The permeate is discharged into that river. According to statistics from the University of Wisconsin and the State Agriculture Department, the river has improved since the new process has been in use.

INFORMATION/CONTACT

G. O. Walraven
Green Bay Packaging, Inc.
P. O. Box 1107
Green Bay, Wisconsin 54305

PROJECT/TITLE

Waste Oil Recycling and Disposal

CITATION

N/A

ABSTRACT/SUMMARY

This publication contains information on the generation, collection, and disposal of waste oil. It is a technical evaluation of current refining, and other disposal processes, and an assessment (environmental) of the gaseous, liquid and solid wastes discharged from such processes. A feasibility test was conducted in a single metropolitan area for a survey designed to obtain information from service stations, waste oil collectors, and industrial users. The project also sought to obtain a national material balance to determine the ultimate fate of used oils.

STATUS

Project completed. Publication:	GPO-EP1.23/2:670/2-74-052	$4.00
	NTIS PB 234857/AS	$6.50

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Food Processing Wastes

CITATION

N/A

ABSTRACT/SUMMARY

This project dealt with the wastes generated by Oregon's primary food processing industry, and involved the evaluation of waste occurrence and waste disposal systems currently being used; estimation of the extent and seriousness of present and future problems; establishment of guidelines for the selection of research which could most reasonably help alleviate the critical pollution problems; and implementation of individual research projects involving waste reduction, waste treament, and by-product development.

The end-of-pipe flows and the discharges from unit operations were monitored for flow, pH, temperature, settleable solids, turbidity, suspended solids, total solids, coliform, total coliform, fecal streptococcus, COD, BOD and chemical concentrations. The results are expressed, where appropriate, as concentrations (e.g., mg U) and in terms of production (e.g., lb/T).

STATUS

Information and publications may be acquired from the Food Science and Technology Department, Oregon State University.

Note: The effluents were tested through spray irrigation methods using "guess amounts," and results of the various concentrations were recorded. Concentration results are listed for each food processing industry.

INFORMATION/CONTACT

Mr. Soderquist
Food Science & Technology
Oregon State University
Corvallis, Oregon 97331
(503) 752-1141, 6719

PROJECT/TITLE

Sewage Disposal On Forest and Associated Lands

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this project is to determine methods for disposal and utilization of sewage effluent and sludge on forest lands without pollution of ground and surface waters, determine the soil physical and chemical characteristics necessary for proper sewage effluent and sludge applications on native and exotic forest vegetation.

Municipal and industrial sewage effluents were applied to a comprehensive range of solids and forest vegetation at field locations in conjunction with municipal land disposal projects. Soil and ground water samples were analyzed for nutrient elements and for potentially toxic materials. Changes in composition in native plant communities and the growth of native and exotic plants were studied following application of chlorinated secondary sewage effluent, wastewater from sewage lagoons, and stabilized sewage sludge to forest lands.

STATUS

The project is a continuing one. Considerable data has been collected that shows that nitrogen is the major pollutant. Reports may be obtained upon request.

INFORMATION/CONTACT

Stephen Nesbitt
North Central Forest Extension Service
Harrison Road
East Lansing, Michigan
(616) 775-7776

PROJECT/TITLE

Effects of Spray Irrigation of Municipal Wastewater on the Rate and Total Accumulation of Heavy Metals

CITATION

N/A

ABSTRACT/SUMMARY

The specific objective of this project was to determine the total amount and rate of accumulation of selected heavy metals in several soil-vegetation ecosystems which were spray irrigated with treated municipal sewage effluent and sludge for twelve years. The proposed study was conducted at the Wastewater Renovation and Conservation Project Facility on the Pennsylvania State University farm where experimental plots were spray irrigated with various amounts and combinations of treated municipal sewage effluent and liquid digested sludge. The soil and vegetation in each area was sampled for analyses of selected heavy metals to determine the amount and rate of accumulation and to correlate these results with the application rates and vegetation cover types. Soil and foliar samples from previous years were analyzed.

STATUS

Completed. Publication: Renovation of Secondary Effluent For Re-Use As A Water Resource - GPO-EP1.23/2:660/2-74-016 $4.80
NTIS-PB 234176

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Environmental New Town

CITATION

N/A

ABSTRACT/SUMMARY

The Mitre Corporation has been involved in the designing of an innovative city designed from the outset to be a model of environmental protection equipment and systems fabrication. The innovative city concepts for energy, transportation, education, communications, and waste disposal systems and in outlining site plans, city-industrial base and infrastructure, and financial implications are discussed.

STATUS

There have been several briefing sessions with HUD and other federal agencies. The project, Environmental New Town, was a joint research effort.

INFORMATION/CONTACT

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Mitre Corporation
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McLean, Virginia 22101
(703) 790-6000

PROJECT/TITLE

Environmental Carrying Capacity as a Concept in Comprehensive Regional Planning - A Feasibility Study

CITATION

N/A

ABSTRACT/SUMMARY

In response to the need to better understand the impacts of development and management activities across entire regional systems, this research examined approaches for measuring and understanding the capacity of regional environments to absorb or support activities in such areas as resource use, land development, waste disposal, transportation, and wildlife and watershed management. The focus was upon environmental carrying capacity of regional systems and subsystems as a concept for assessing changes in environmental quality due to large-scale development, management, and planning activities and as a basis for planning and decision-making models and methods. In this regard, efforts were made to define and develop indicators for describing a region, to identify parameters necessary to design and implement models of regional carrying capacity, to assess data requirements and strategies for data collection and management, to indicate procedures for validating or testing potential models, and to identify facilities, personnel, and estimate costs for model development.

STATUS

Completed. EPA Publication #600/5-74-021 (Pending).

INFORMATION/CONTACT

Professor A. B. Bishop
Civil Engineering
Utah State University
Office of Engineering, Room L50
Logan, Utah 84321

PROJECT/TITLE

Bibliography - Influence of Solid Waste Management Practices on the Environment

CITATION

N/A

ABSTRACT/SUMMARY

The objective of this continuing activity is to compile, in a readily available source, pertinent articles describing the influence of various solid waste management practices on the quality of surface water and groundwater. Such information is frequently requested from other activities within EPA and from public and private interests outside of the EPA. The work done to date has been used by Government and private engineers and scientists to more accurately assess the impact of solid waste management practices on the environment. Primary emphasis has been in the sanitary landfill area. Two reports have been published and future work will update these basic reports. The Solid Waste Information Retrieval System is used along with other sources to perform this activity.

STATUS

The bibliography is published each June in the publication Water Pollution Control Journal. The initial bibliography was published in June, 1970, and has been updated and revised annually since 1970.

INFORMATION/CONTACT

Dr. Dirk Brunner
U.S. Environmental Protection Agency
National Environmental Research Center
5555 Ridge Avenue
Cincinnati, Ohio 45213
(513) 684-4487

PROJECT/TITLE

Phosphoric Acid Recovery System

CITATION

N/A

ABSTRACT/SUMMARY

This project is directed toward recovering acid and regenerating the processing solution of high acid content that is produced in bright aluminum processing. Lancy Laboratories has developed a process aiming for the separation of the acid and the aluminum content of the solution. This process promises an economical recovery of the acid and regeneration of the processing solution. Bright aluminum processing uses a solution of high acid concentration which loses its usefulness as the aluminum concentration increases.

The proposed concept has broad applications for treating waste process solutions used in the metal finishing industry. Successful demonstration of the process may have important environmental impact by significantly reducing chemical consumption and thereby reducing the waste sludges generated as well as the associated large land requirements for disposal.

Presently, 35 percent of the acid solution is sold to producers of fertilizer. The project is just starting up and is in the testing stage. Some laboratory data is available on request. Maximum recovery to reduce pollution is the primary goal.

STATUS

Project is ongoing. Some publications are available upon request.

INFORMATION/CONTACT

Elbert Fang EPA Cleveland, Mississippi	or	H. A. Lomason Douglas & Lomason Company Detroit, Michigan 48208 (313) 873-2400

EVALUATION OF ALTERNATIVES

SECTION III

PROJECT/TITLE

Survival and Movement of Viruses in Landfilled Solid Waste

CITATION

N/A

ABSTRACT/SUMMARY

The objectives of this project are to determine the survival patterns of viral pathogens in landfilled solid waste and to evaluate the potential contamination of water resources through leaching of viruses from a waste disposal site. Microbiologic monitoring leachates from Cells #1 and #2 is being conducted in order to determine the degree of health hazard involved in solid waste disposal by landfilling. The results so far indicate that poliovirus may survive in compacted solid waste for at least 13 days at temperatures of 68-80 degrees F, but the virus is inactivated in 2 to 4 days in a landfill with temperatures ranging from about 120-140 degrees F.

STATUS

Publication pending.

INFORMATION/CONTACT

Merzda Peterson
Research Triangle Park
Durham, North Carolina
FTS 8-629-2601

PROJECT/TITLE

Pilot Plant Treatment of Sanitary Landfill Leachate

CITATION

N/A

ABSTRACT/SUMMARY

Treatment of leachate from landfills is a practical necessity in many cases. Where a sewerage system is available, treatment can be performed at the central plant; otherwise, treatment must be performed on-site. No performance data was available on lab, pilot, or traditional wastewater methods. This research grant effort was intended as a brief survey of treatment methods with pilot plant application of the most feasible. Detailed analyses of each method were not expected. The final outcome of this study is a practical on-site treatment scheme and an evaluation of how much leachate can be added to conventional domestic wastewater treatment plants when leachate is discharged to a sewerage system. It has been determined that a conventional biological treatment plant can accept up to 10 percent leachate-domestic wastewater without affecting plant performance significantly. The most promising on-site treatment scheme appears to be anaerobic lagooning followed by aerobic polishing. A pilot plant was established. Results from this portion of work have been compiled.

The laboratory studies utilized leachate from existing landfills initially. Field studies were conducted on a landfill site. The leachate was pumped out and treated. It was necessary to switch to another source of leachate because of the change in the character of the effluent due to the aging of the land (pollutional components were lowered by aging). The pilot plant treated 5 to ten gallons per minute of leachate. A low cost temporary process is needed.

STATUS

Completed.

INFORMATION/CONTACT

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University of Wisconsin
Madison, Wisconsin 53706
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or

David Huntz
Engineering Experiment Station
Madison, Wisconsin
Grant No. R-801814, 1976
(608) 266-2600

PROJECT/TITLE

Evaluation of a Solid Waste Disposal Site

CITATION

N/A

ABSTRACT/SUMMARY

Cortland County has proposed a landfill operation for disposal of solid wastes in the near future. Substantial base line geologic and hydrologic data on the proposed site has been collected, and an array of 50 shallow wells has been emplaced and monitored on a weekly basis since April, 1973.

The primary objectives of this study are: (1) to determine in more detail the hydrologic regime of the landfill site and existent water quality, and (2) to evaluate the effect of landfill operations on this regime over an extended period of time.

The proposed study is particularly significant because considerable geologic and hydrologic parameters can be determined and monitored prior to landfill operation. Continuation of this study after initiation of landfill operations is expected to provide a critical evaluation of the sanitary landfill as a viable means of solid waste disposal.

The proposed study basically involves the establishment and maintenance of a monitoring program for critical weather, hydrologic, and geologic parameters. Data thus obtained will determine the impact of landfill operations on the natural hydrogeologic environment of this area and adjacent parts of New York and Pennsylvania.

STATUS

Continuing project. Articles and publication are available upon request.

INFORMATION/CONTACT

Dr. T. E. Bugh
State University of New York - School of Arts
Cortland, New York 13045

PROJECT/TITLE

Building an Amphitheater and Coasting Ramp of Municipal Solid Waste. Volumes I and II

CITATION

Final rept. Beck, William M., Jr.

ABSTRACT/SUMMARY

By 1966, disposing of solid wastes in the City of Virginia Beach, Virginia had become a critical problem. At the same time the number of residents and tourists was increasing each year, thus requiring that more solid waste be disposed of, land values were also rising. This latter factor dictated against using land suitable for residential, commercial, or recreational purposes for solid waste disposal. In addition, the presence of high water table (5-8 ft) makes deep pit excavation impractical. The concept was advanced that an existing dump located on relatively inexpensive land be converted into a recreational site by building a 65-foot hill of solid waste. Provision would be made for a 10,000 seat amphitheater, a soap box derby ramp, a fresh water lake, and parking facilities. Details are presented on design and construction techniques, operating procedures, equipment used, problems encountered, water and gas sampling methods, economic factors, and public reaction.

STATUS

Available from NTIS $6.50/MF $1.45

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Sulfur Application for Land Pollution Abatement

CITATION

N/A

ABSTRACT/SUMMARY

The purpose of the project is to investigate methods for using sulfur to stabilize tailing piles to assure long-term resistance to weathering and to determine the applicability of sulfur for constructing impervious ground cover bases for sanitary landfill, leach dumps, and mill ponds.

The project is an ongoing one and has been in progress for over 14 years. The project is also aimed at cutting back on wind erosion by spray coating to hold down various materials and prevent them from blowing away. Unusual success with uranium mill tailings has been demonstrated. Spray coating has played a very significant part in holding back radon gas.

STATUS

Ongoing project. Contact will research back for information pertaining to other projects that impact upon ground and surface water upon request.

INFORMATION/CONTACT

Donald G. Kesterke or Wm. McBee
U.S. Department of the Interior
Bureau of Mines
500 Date Street
Boulder City, Nevada 89005

PROJECT/TITLE

Suspended Solids Monitor

CITATION

J. W. Liskowitz, G. J. Francey, and J. Tarzynski, American Standards, Inc., New Brunswick, New Jersey

ABSTRACT/SUMMARY

A method for measuring concentration of suspended solids in liquid media, based on depolarization of backscattered polarized light, has been developed and instrumented. Feasibility studies and field evaluation of the instrument, using sewage influent, effluent and sludge, showed that there is a specific relationahip between concentration of solid particles and polarization ratio. It was also shown that the relationship is independent of size distribution and density of particles, color of particles or solution, sludge consistency, velocity, and build-up of solids on the optical window. The field evaluation results indicate that this instrument provides a continuous instantaneous in situ measurement of suspended solids concentrations in combined sewers and other wastewater flows. This report was submitted in fulfillment of Project No. 11024DZB, Contract No. 14-12-494 by American Standard, Inc. under the sponsorship of the U.S. Environmental Protection Agency. Work was completed in August, 1970.

STATUS

Completed in August 1970. Publication pending.

INFORMATION/CONTACT

Field, R.
(201) 548-3503

EPA - Edison, New Jersey 08817

PROJECT/TITLE

Closed Process Water - Loop in NSSC Pulp Production

CITATION

N/A

ABSTRACT/SUMMARY

The project objective is to accomplish the maximum closure of the water use loop in an integrated neutral sulfite semichemical pulp and paperboard mill by: recycling contaminated process waters for direct reuse; providing a protective collection and surge system for excess surge volumes occurring during process upset conditions; providing a reverse osmosis plant to separate dissolved constituents from such excess volume as occurs, recycling the permeate so produced to replace fresh water. The separated dissolved solids will be destroyed in an existing fluid bed combustion system. A second objective of the project is to demonstrate the important results of operating with the tightly closed system on the production of NSSC paperboard. Effective techniques derived to identify and cope with problems of high dissolved solids and high temperature in the papermaking process will be developed over a year's operation of the proposed facility integrated with regular mill operations. The required techniques to stabilize operations and control ambient paper machine conditions have not yet been demonstrated in the paperboard industry.

STATUS

The project will terminate in August, 1975 after a six-month extension due to problems encountered in the reverse osmosis system. As far as the closure is concerned, the project has been successful in that the BOD suspension was low in cost. However, water removal and water balance have been a problem in the reverse osmosis process due to the removal of excess water from spasmodic events (snow, machine breakdown, etc.).

The permeate was relatively pure with the exception of acid, considering the fact that there are 27 paper mills and four large communities upstream from the Fox River. The permeate is discharged into that river. According to statistics from the University of Wisconsin and the State Agriculture Department, the river has improved since the new process has been in use.

INFORMATION/CONTACT

G. O. Walraven
Green Bay Packaging, Inc.
P. O. Box 1107
Green Bay, Wisconsin 54305

PROJECT/TITLE

Improved Waste-Treatment System Design Based on the Natural Thermal Environment

CITATION

N/A

ABSTRACT/SUMMARY

Low-maintenance, technology-simple (LMTS) waste treatment systems (systems having minimal dependence on electrical and mechanical equipment) offer an attractive alternative to technology-intensive, package plants currently being used to treat wastewaters from subdivisions and isolated recreational areas. Although package plants are advertised to perform satisfactorily with a minimum of operational control, experience has shown that they are subject to serious operational and performance problems.

The objective of the proposed research is to establish procedures with which the engineer can make a rational design of a LMTS waste treatment system based on (1) easily obtained meteorological data and (2) effluent standards applicable to the location of the system. This objective will be achieved by: 1. the definition and formulation of the time-varying thermal characteristics of that portion of the earth's surface extending from the surface to a depth of approximately 10 meters, 2. the characterization of domestic wastewater temperatures, 3. the application of recent research related to temperature effects on biological processes to the design of LMTS treatment units, and 4. the evaluation of the predicted characteristics of these units in light of current and anticipated effluent standards.

STATUS

Project ended June 1976 and is waiting for publishing.

INFORMATION/CONTACT

Dr. L. G. Rich
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Rhodes Research Building
Clemson, South Carolina 29631
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PROJECT/TITLE

Environmental New Town

CITATION

N/A

ABSTRACT/SUMMARY

The Mitre Corporation has been involved in the designing of an innovative city designed from the outset to be a model of environmental protection equipment and systems fabrication. The innovative city concepts for energy, transportation, education, communications, and waste disposal systems and in outlining site plans, city-industrial base and infrastructure, and financial implications are discussed.

STATUS

There have been several briefing sessions with HUD and other federal agencies. The project, Environmental New Town, was a joint research effort.

INFORMATION/CONTACT

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1820 Dolly Madison Blvd.
McLean, Virginia 22101
(703) 790-6000

PROJECT/TITLE

Joint Siting of Electrical Power Plant and Advanced Wastewater Treatment Plant Feasibility Study

CITATION

N/A

ABSTRACT/SUMMARY

Description: The purpose of this study was to evaluate five advanced wastewater treatment (AWT) plant sites and various treatment processes, including land disposal and sludge. Joint siting of an electrical power plant and an AWT plant was considered because of the possibility of reducing the overall environmental impact as compared to separate siting. Alternatives affiliated with the power plant include the following: location of the AWT plant at the power plant site, using clear effluent as make up to the power plants cooling towers and burning the AWT plant's organic solids in the power plant's furnaces; locating the AWT plant at a lower basin site with clear water transmitted to the power plant and alternate methods sludge disposal; land disposal of sludge in connection with the power plant's use of partially treated wastewater. The study concludes that to meet the quality standards, for discharges into the Potomac River, treatment processes are limited to AWT or land disposal. Land disposal requires considerably more land than an AWT plant and would consequently cost more and displace more families. For those and other reasons, an AWT plant is recommended. The joint location of the AWT plant and the power plant proved to have many advantages and to be entirely feasible and acceptable from the technical, economic, and environmental viewpoints. However, due to community reaction and socio-political factors, the joint siting project was rejected by the governing body. Plant is under design and is nearly completed. Construction is scheduled for next year (1976).

STATUS

Currently under construction.

INFORMATION/CONTACT

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Battelle Memorial Research
505 King Avenue
Columbus, Ohio 43201
Montgomery County E.I.S.

J. W. Filbert
Cornell, Howland, Hayes & Merry
1930 Isaac Newton Sq. Rm 202
Herndon, Virginia 22070
(703) 471-9710
Region 3

PROJECT/TITLE

Framework for Analyzing and Selecting Among Alternatives for Regional Solid Waste Management

CITATION

N/A

ABSTRACT/SUMMARY

Considerable interest and suggestions concerning economies of scale in regional solid waste management systems have been expressed. The economic feasibility of regional solid waste management was investigated. Primary emphasis was on the development of a model framework to facilitate analysis and selection among alternatives for regional solid waste management systems, including implications for regional economics.

STATUS

Completed. EPA 670/5-74-006

INFORMATION/CONTACT

B. H. Stevens
Regional Science Research Institute
G.P.O. Box 8776
Philadelphia, Pennsylvania 19104
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PROJECT/TITLE

HUD - Modular Integrated Utility System Program

CITATION

N/A

ABSTRACT/SUMMARY

Description: The Modular Integrated Utility System (MIUS) is directed at providing utility service (electricity, environmental conditioning, water treatment, waste treatment and disposal) for communities of limited size, and to provide these services: (1) in an improved manner (relative to current practice) with advantages in total cost, decreased environmental impact and increased efficiency in the utilization of natural resources; (2) at a pace equal to the rate of growth of a development; and (3) to make available land for development that is not being serviced by conventional utility systems. The MIUS Program goals are to demonstrate the technology and economics of the MIUS under actual use conditions. The ORNL effort to date has consisted of conceptual design and system analyses activities. The MIUS might employ gas or oil powered engines to generate electricity for a building complex. The engine exhaust and coolant exhaust heat would supply the buildings with some of their hot water, some of their space heating, and some of their air conditioning from heat absorption-type water chillers. Water from the liquid waste treatment plant might be heated with inexpensive exhaust heat and purified to a degree acceptable for recycle as cooling water or perhaps, some day, even drinking water. Additional gas or oil, solid waste, and sludge from processing liquid waste might be burned whenever the "waste" heat from generating electricity is sized to accommodate perhaps 100 to 3000 multifamily dwelling units, nearby single-family housing, and associated commercial facilities--a common range of units for a single undertaking and simultaneous construction in a community development or redevelopment.

STATUS

The MIUS Impact Statement is now in review and negotiations with a developer for construction of a demonstration unit are in progress. Construction will begin as soon as a site has been selected and approved by HUD.

The Public Health Service has vehemently opposed the reuse of any quality wastewater. They have resisted the concept of wastewater reuse from the very beginning of the project even though the quality of processed wastewater has been at or above the acceptable standard of water quality. Publications: The Water Report HUD OR&L-HUD-MIUS-16 "Liquid Waste Treatment-Collection and Disposal-MIUS #16 - Review of Oak Ridge Treatment System, Performance and Available Sizes. Waste Water Re-use."

INFORMATION/CONTACT

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Oak Ridge, Tennessee 37830
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SOCIO-ECONOMICS AND INTERGOVERNMENTAL ASPECTS OF RESIDUAL WASTE

SECTION IV

PROJECT/TITLE

Economic Analysis of Land-Intensive Wastewater Systems

CITATION

N/A

ABSTRACT/SUMMARY

The 1972 Water Pollution Control Act Amendments are requiring increased treatment of municipal wastewaters. One method to obtain a high quality effluent at relatively low cost compared to other techniques is land treatment.

This study compares and evaluates conventional in-plant treatment and land treatment in a cost framework and in a production efficiency framework. The major objective is to explain why more municipalities have not chosen land treatment in the past.

STATUS

Publication available.

Publication: Water Resources Research Institute of the University of
North Carolina
UNC-WRRI-74-98 $4.00

Title: Economic Analysis of Land Treatment of
Municipal Wastewaters - G. A. Carlson
Article: Water Resources Journal (1975)

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Lee County Solid Waste Management Project

CITATION

N/A

ABSTRACT/SUMMARY

Solid waste disposal in both the incorporated municipalities and rural areas of Lee County was unsatisfactory. The City of Tupelo made an attempt at operating a sanitary landfill in an undesirable location. With poor operation, the results were open burning, water pollution, and insect and rodent production. Disposal sites for other areas in the county were nothing more than open dumps. Garbage and rubbish collection was provided by the City of Tupelo, the towns of Nettleton and Saltillo, and by one private collection service. The citizens of the other towns hauled away their own solid wastes. Garbage storage is known to be very poor at most of the homes in the small towns. The prime objective of the project was to demonstrate the feasibility of a county-wide plan for solid waste management. A centrally-located sanitary landfill near Tupelo was operated by the county for disposal.

The solid waste management project was successful, and, as a result, most counties in Mississippi are now using a system of mobile containers.

The wells around the landfills are continuously monitored. To date, there has been no evidence of leaching.

STATUS

Entered in NTIS PB-241468

INFORMATION/CONTACT

Tommy Dablis
703 Crossover Road
Tupelo, Mississippi 38801
(601) 842-7381

PROJECT/TITLE

Indiana Solid Waste Management

CITATION

Indiana Department of Commerce, Indianapolis, Division of Planning

ABSTRACT/SUMMARY

The report is a general background paper on the social, economic and physical problems caused by solid waste. It covers solid waste management in terms of the problem of collecting, processing, treating and disposing of solid waste and the need for cooperation between the rural and urban sectors in these areas and also in the areas of administering and financing the operation. The appendix is a summary of Indiana's laws which regulate refuse and its disposal.

STATUS

$4.25/MF $0.95

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Third Pollution: the National Problem of Solid Waste Disposal.

CITATION

N/A

ABSTRACT/SUMMARY

The political aspects of solid waste disposal are discussed. The first solid waste law provided that a national research, development, and demonstration program be initiated and directed by the Department of Health, Education, and Welfare. The Bureau of Solid Wastes Management spread its funds to cover research, development, and demonstration needs among three sources of solid wastes: urban, industrial, and agricultural. The problem is that the Bureau has been given little financial support. Through the concept of revenue-sharing, the administration feels that municipalities will be able to solve their problems. However, waste disposal responsibility is often relegated to political jurisdictions too small to have sufficient resources for the job. Many communities and municipalities are beginning to realize that the regional approach to solid waste disposal is practical and economically feasible. Suggestions are made for future legislation concerning solid waste. It is recommended that the concepts of conservation and the economic balance of social progress be incorporated into future laws.

STATUS

Published by Praeger Publishers. This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

A Role for Selective Public Acquisition and Control of the Development and Utilization of Industrial Sites

CITATION

Recent Developments in Industrial Pollution Control; Proceedings of the Fourth Annual Northeastern Regional Antipollution Conference, University of Rhode Island, July 13-15, 1971, Technomic Publishing Co.

ABSTRACT/SUMMARY

In choosing a site for a power plant, oil refinery, or other industrial complex, environmental factors should surely be considered. However, the term "environmental factors" is too frequently construed to mean only the industry's impact on water, air, and land pollution. If we are to avoid all environmental damage by industry, then we shall have to outlaw industry. The American public has not yet expressed a willingness to lower its standard of living to curb the stress placed on the ecology by industry. Therefore, since no plant can be located where it will do absolutely no damage to the environment, other, broader factors must be considered as well. The impact of the new industry on the socioeconomic life of the area, such as its ability to provide jobs in areas with high unemployment, should also be judged as part of its environmental impact. A new industry may help, if intelligently located, to stem the rural-urban migration, thereby keeping the population distribution more balanced. These are decisions that must be made, not by the industry involved, but by the planning arm of the electorate. To this end, industrial parks should be bought in advance of need and their tenants or lessees chosen as a matter of public policy.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Attitudes of Illinois Citizens Toward Solid Waste and the Environment

CITATION

Sigler, Jeanne: Illinois Institute for Environmental Quality, Chicago, Illinois University, Urbana, June 1973; 140p

ABSTRACT/SUMMARY

A survey of citizens throughout Illinois was made to determine their attitudes toward the problem of solid waste. In general, city size or regional differences were noted as the most important predictors of respondent attitudes toward the environment. Residents of large cities (>100,000) expressed more concern for the collection, processing, and disposal of their trash and garbage than others. Next to residents of large cities, those living in the open country had the most serious solid waste problems, due either to the difficulty of disposal of crop and animal wastes, or to the lack of adequate collection services.

STATUS

N/A

INFORMATION/CONTACT

Available from NTIS; pc 9.00/m $1.45
PB-223457/3

PROJECT/TITLE

Relationship Between Recycling and Resource Attitudes and Behavior

CITATION

N/A

ABSTRACT/SUMMARY

Objective: Determine whether participation in a community recycling program affects attitudes toward resource issues and behavior respecting environmental problems, and, if so, determine the nature of the effects for different sorts of participants and different sorts of participation.

Approach: Participants in the recycling program run by the Ann Arbor Ecology Center were surveyed on each of the following dimensions: (1) length of time they have recycled; (2) substances recycled; (3) participation in other resource-related activities both personal (i.e. composting) and societal (i.e. lobbying); (4) attitudes toward resource problems generally, and waste disposal, resource scarcity, and energy conservation in particular; (5) attitudes toward recycling and its value; (6) knowledge of resource issues; (7) sense of personal efficacy on resource problems. In the correlational analysis that followed, (1), (2), and demographic variables were analyzed for their effects on the remaining dimensions. Analysis of results is continuing and new data may be collected as the hypotheses are sharpened.

STATUS

N/A

INFORMATION/CONTACT

P. Sandman
University of Michigan
School of Natural Resources
Ann Arbor, Michigan 48104

RESIDUAL WASTE MODELS

SECTION V

PROJECT/TITLE

Automated System for Water Pollution Control from an Animal Production Unit

CITATION

N/A

ABSTRACT/SUMMARY

The specific aims of the project were: 1. To continue to monitor with weekly sampling and laboratory analyses the overall performance characteristics of the plant. 2. To install, test and evaluate the performance of the aerobic digester equipment to be provided by DeLaval Company, or if not by them, to purchase and build a surface aerator for installation in the aerobic digester. 3. Surface aerator; submergence and speed variation in rotor; turbidity improvement of the effluent with the use of coagulants; evaluation of chlorine disinfection of the recycled effluent. 4. To automate the disposal of solids onto the nearby farm land with the use of automatically operated irrigation system. 5. To establish some monitoring stations for sampling and analyzing the water from the Loramie Creek that receives the drainage from the research farm of the Botkins Grain and Feed Company. 6. Develop an economic model of the plant to evaluate ways of making the system economically feasible.

STATUS

Completed.

The project was monitored for 3 yrs., and is reputedly the longest study of a project of this type. The report is well documented. The findings were presented in April, 1975 at a conference.

The report has been cleared for publication and is awaiting printing by EPA.

INFORMATION/CONTACT

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Agricultural Engineering
Ohio State University
School of Agriculture
190 N. Oval Dr., 102 Administration Bldg.
Columbus, Ohio 43210
(614) 422-6626

PROJECT/TITLE

A Predictive Model for the Configuration of and Concentration Variations within Malenclaves Resulting from Refuse Landfills

CITATION

N/A

ABSTRACT/SUMMARY

The objective is to further develop and test a predictive model relating the contamination variations within a malenclave to the water-table gradient, permeability, distance from source, depth, age of landfill and precipitation. Approach is to predict the contamination qualities for various landfills from the model and compare predicted to actual conditions. Test sites will be both previously studied landfills and new sites. At the new sites ground water quality will be sampled from well nests containing boreholes to 15, 25, and 40 feet and analyzed by usual chemical techniques.

STATUS

Final phase of project. Publication of report expected in November 1976.

INFORMATION/CONTACT

L. V. Sendlein 294-8252
R. C. Palmquist 204-7814
Iowa State University
Water Resources Research Inst.
403 Town Engineering Bldg.
Ames, Iowa 50010

PROJECT/TITLE

Thermophilic Aerobic Digestion of Organic Solid Wastes
(Andrews, John F., Kambhu, Kawi)

CITATION

N/A

ABSTRACT/SUMMARY

The major reactions involved in the process of thermophilic aerobic digestion are presented, discussed, and simplified into the basic stoichimetric, thermochemical, kinetic relationships. A simple procedure is presented for determining the thermochemistry of the net reaction by relating heat production to the oxygen equivalent or C.O.D. of the organic solids.

The simulation studies and mathematical model discussed employ conservative values of biological parameters. The mathematical model provides assistance in planning and conducting pilot plant studies.

STATUS

Final Report. - NTIS $6.25/MF $1.45
PB 222 396

INFORMATION CONTACT

Clemson University
S. C. Dept. of Environmental System Engineering
Clemson, S. Carolina 29631

PROJECT/TITLE

Water-Quality of Selected Solid-Waste Disposal Sites, Suffolk County, Long Island, New York

CITATION

Preliminary Findings of a Leachate Study on Two Landfills in Suffolk County, New York. By Grant E. Kimmel and Olin C. Braids. Journal of Research, U. S. Geological Survey, Vol. 3, No. 3, May-June 1975, p. 273-280

ABSTRACT/SUMMARY

In anticipation of the expected population growth in the county, water planning and management agencies feel the need for regulation in the operation of solid-waste disposal sites and in the selection of new sites, so as to prevent unreasonable or unnecessary deterioration of the quality of the ground water or of the environment. In drafting regulations, information is needed with regard to the character of the leachate and chemical reactions that may occur in the zones of aeration and saturation. In this respect information was needed on incinerated solid waste as well as the general variety of solid wastes.

The major objectives of this project were to (a) document the nature and extent of changes in the chemical quality of the ground water associated with solid-waste disposal at one or more selected sites, and (b) apply existing modeling techniques to predict the nature and rate of change (both as a function of time and space) of the chemical quality of the ground water. To the extent possible, modeling efforts involved the zone of aeration and the zone of saturation.

STATUS

N/A

INFORMATION/CONTACT

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PROJECT/TITLE

Regional Management of Animal Manures

CITATION

Dodd, V.A., D.F. Lyons, and J. R. O'Callaghan.

ABSTRACT/CONTACT

It is proposed that a centralized storage facility should be provided for a group of pig and/or poultry units. The manure that is collected and brought to the central store can be disposed of by spreading on land in a separate operation. A mathematical, analytical model is constructed to determine the best place to locate the central store, and spread the manure. The model was applied to a specific region containing 58 pig fattening units. Results showed that the system may be economically attractive, having as additional advantages the minimization of pollutional hazards and the relieving of the pig or poultry farmer of the task of manure management.

STATUS

SWIRS Library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Optimization Models for Regional Public Systems.

CITATION

Vasan, K.S., Berkeley, University of California, Operations Research Center, Feb. 1974. 128 p.

ABSTRACT/SUMMARY

Optimization models for regional solid waste management systems are presented and discussed. A review of papers and reports on the application of systems analysis and operations research to the problems of solid waste management is presented. The development of optimization models for regional solid waste management systems is discussed. The mathematical formulation of the problem is included and methods of solving static models are described. The algorithms used in the solutions are discussed. Sample problems for each of three static models are solved. Data and functions used in these solutions are included. A mathematical formulation of the long range planning of locations and expansion of facilities for regional management of solid waste systems is presented and the procedure for its solution is demonstrated.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Stochastic Population Dynamics for Regional Water Supply and Waste Management Decision-making

CITATION

Ph. D. Thesis, University of Massachusetts, Amherst, Mass., 1970

ABSTRACT/SUMMARY

A rational methodology for local area population projection and water and sewer service area prediction is developed. The projection model consists of a stochastic simulation of inter-regional population growth and a finite difference solution to a non-linear partial differential equation describing spatial variations in urban population densities. The projection model output is designed as input to optimization algorithms for regional water supply and waste treatment facilities. The components of demographic change are modeled as regressive stochastic processes, and response surface algorithm is developed to decompose net migration rates into in-and-out migration rates. Service area prediction is based on a computerized evaluation of the distance-density relations at the existing service area periphery. Comparison of results to preliminary census figures for 1970 indicates a superior prediction performance over traditional methods of population projection as practiced by consulting engineers and planners. (T)

STATUS

This thesis available from University Microfilms, order no. 71-6390.

INFORMATION/CONTACT

Univ. of Massachusetts
Amherst, Mass. 01002

PROJECT/TITLE

Regional Planning Models for Solid Waste Management

CITATION

Kuhner, J., and B. Heilet; static LP-model. In Models for environmental pollution control. Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1973. p.344-347

ABSTRACT/SUMMARY

The static average distance Lp-model can be used for today's unusual regional transportation and processing problems. It is further generalized to include more of today's recognized processing and disposal alternatives. Engineers and planners should be able to extend the models to include all the alternatives available in regional solid waste management. These models can also be extended to include more constraints. The static LP-model can also be extended and serve as an introduction to fixed charge problems and mixed integer programming. A problem arises when regionalization is contemplated to take over the existing facilities of many independent operations. Some of the existing activities may need to be phased out as economically infeasible, and associated with the phasing out will be costs such as dismantling an incinerator or recultivating over a dump. Considerations of the problems concerning regional solid waste management showed that extensions to the simpler static average location model would be strongly desirable. Unfortunately, many of the desired extensions cannot be solved by an LP but would also require solution by mixed integer programming.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

A Pollution-Free System for the Economic Utilization of Municipal Solid Waste - Phase II

CITATION

N/A

ABSTRACT/SUMMARY

This is the final phase of a project in which the most cost-effective pollution free system for the conversion of solid waste generated in New York City to a source of energy and recyclable materials will be designed. The manual will be especially addressed to nontechnical municipal authorities and decision-makers faced with the problem of choosing among the many competing advanced technology options in Solid Waste Management.

A complete system has been designed for Westchester County to test the generalizability of the results to a lower density suburban community having no resident electric utility. The manual summarizes the quantitative and qualitative findings of the project in well digested, generic terms to facilitate their dissemination to other American municipalities of varying sizes. The manual is a compendium of four position papers.

STATUS

The manual is near completion. Publication is expected in August, 1975. The title is Resource Recovery Handbook for Public Officials.

INFORMATION/CONTACT

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PROJECT/TITLE

Projection and Analyses of the Economies of Substate Planning Districts in Oklahoma

CITATION

N/A

ABSTRACT/SUMMARY

The present study attempts to construct a data base for substate planning. The emphasis is on estimating an analytical model of the economic base for each of the planning districts in Oklahoma. Analysis of the economic base is for purposes of projecting employment and income levels and for estimating the impact of changes in the planning district economies.

The study is structured primarily for use by regional planners in Oklahoma. Regional Planners should find it useful for purposes of community services planning, public capital budgeting, or for other areas of community development planning. Most technical detail has been relegated to appendices. The study, however, should also be found useful to research scientists investigating spatial requirements for transportation, energy, water, or other critical resources.

STATUS

Publication available upon request.

INFORMATION/CONTACT

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(405) 372-7511

PROJECT/TITLE

Models for Environmental Pollution Control

CITATION

Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1973. 448 p.

ABSTRACT/SUMMARY

Mathematical models and systems analysis techniques for the control of environmental pollution and resources development are discussed. The studies included combine mathematical modeling, systems analysis, and computer techniques with environmental pollution control technology. The volume is addressed to the scientists and engineers who are involved in the control of environmental pollution. The role of systems analysis and mathematical modeling in the areas of water pollution control, water supply and water resources development, air pollution control, solid waste disposal, noise control, and total environment systems is discussed. Solid waste management models and regional waste disposal planning models are presented. The use of mathematical modeling in designing refuse collection systems and routing patterns for street cleaning and snow removal operations is explained.

STATUS

This document is retained in the SWIRS library.

INFORMATION

N/A

PROJECT/TITLE

Total Environmental Quality Management Models

CITATION

In Models for environmental pollution control, Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1973. p. 403-436

ABSTRACT/SUMMARY

Traditionally, gaseous, liquid, and solid waste management problems have been dealt with separately with little or no concern for the other environmental media, such as atmosphere, water courses, and land, into which residuals are discharged. The purpose of this study is to delineate the entire regional residuals management system, including the range of management options available to society for improving environmental quality, and to indicate how all the components of the system may be expressed and utlimately linked together within the same computational framework. A regional residuals management model that includes all the relevant management options available to society for improving environmental quality consists of residuals generation and discharge models, environmental modification models, environmental quality models, damage functions, and management strategies. The management model is formulated quantitatively and mathematical forms of the various environmental models are discussed. An atmospheric dispersion model and an aquatic ecosystem model are included. Computational schemes for selecting an optimal management strategy are suggested.

STATUS

This document is retained in the SWIRS library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

The Planning Process

CITATION

Solid Waste Management Plan
Olympia, Washington, Department of Ecology, State of Washington, 1.4.72

ABSTRACT/SUMMARY

A model for the procedural process in developing a local solid waste management plan is provided. It must be remembered that planning is not as static a process as a model would suggest; it is dynamic and continuous. At many points in a planning process feedback into the system occurs, which may influence the plan and make changes necessary. Outside events may also affect the suitability of the plan. The first step in any planning process is awareness of the existence of a problem. This realization leads to data collection which may determine further aspects of the difficulty. Once the problem is fully identified, objectives can be formulated. Several alternatives may be available to achieve the objectives set forth. Identifying alternatives and deciding among them requires the continuing assistance of a interdisciplinary technical advisory staff. These experts may rule out some alternatives as impractical or economically prohibitive, while they may propose other solutions that had not occurred to the planning agency. Existing plans, such as State, regional or local plans, should be taken into consideration. Public information must be dealt with at every phase of the planning process. Only by informing the public of what problems are being attacked and what solutions considered can the planners be assured of maximum public support for the final planning phase, the establishment of the plan.

STATUS

N/A

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Land-Use Models for Residential Development in Rural-Urban Fringe Areas

CITATION

N/A

ABSTRACT/SUMMARY

OBJECTIVE: Delineate potential residential development sites in a given study area; identify public land-use constraints on development; establish criteria for optimal residential development in terms of needed services; establish number, type, size, and location of residential development units that would optimize residential development at minimum cost and to minimize urban sprawl.

APPROACH: Published data will be used to identify areas suitable for residential development in a selected study area; zoning information will be used to identify land-use constraints; data from published sources and surveys of public and private agencies will be used to establish minimum costs of providing utility, education, and related services; data gathered in meeting first three objectives will be used in a multiservice location model to estimate optimal residential patterns consistent with objects.

STATUS

A residential location model that minimized combined delivery costs for three public services (sewers, solid waste disposal, and education) was applied to a rural-urban fringe area in West Knox County. The study area contained five tracts with potential for subdivision development. These tracts were designated as potential service demand sites. They varied in size from 18 to 316 acres, and varied also in distance to service delivery points. Three densities of development were considered: low, medium and high--containing 2, 8, and 16 dwelling units per acre, respectively. Combined delivery costs for the three services were lowest for medium and high densities. Cost differences between medium and high densities were smaller than between medium and low densities. Average family sizes associated with each density probably account for this--3.6 persons or 7.2 per acre, 3.0 or 24 per acre, and 1.6 or 25.6 per acre, for the low, medium, and high densities, respectively. Sewer service costs had the greatest apparent influence on per capital combined costs of services. These ranged from $3.38 in one potential high density subdivision to $66.26 in another with low density development. Finally, per capita combined costs for the three services ranged from a low of $6.25 for one high density tract to $79.12 to another under low density development.

INFORMATION/CONTACT

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PART II - LOCAL, STATE AND REGIONAL PLANNING

PROJECT/TITLE

Projection and Analyses of the Economies of Substate Planning Districts in Oklahoma

CITATION

N/A

ABSTRACT/SUMMARY

The present study attempts to construct a data base for substate planning. The emphasis is on estimating an analytical model of the economic base for each of the planning districts in Oklahoma. Analysis of the economic base is for purposes of projecting employment and income levels and for estimating the impact of changes in the planning district economies.

The study is structured primarily for use by regional planners in Oklahoma. Regional Planners should find it useful for purposes of community services planning, public capital budgeting, or for other areas of community development planning. Most technical detail has been relegated to appendices. The study, however, should also be found useful to research scientists investigating spatial requirements for transportation, energy, water, or other critical resources.

STATUS

Publication available upon request.

INFORMATION/CONTACT

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PROJECT/TITLE

Contingency Planning for Resource Recovery

CITATION

N/A

ABSTRACT/SUMMARY

A resource recovery plant has been designed by the National Center for Resource Recovery, and is presently under construction in New Orleans, La. The plant will be operated by a private firm.

The plant is scheduled to open on May 1, 1976, with a 650 ton per day material recovery system that utilizes shredding, classifying and extraction of aluminum, glass, iron, steel, and non-ferrous metals (excluding aluminum and paper. The residuals, which will be mostly organic, will be landfilled.

The waste system was so designed as to have no adverse environmental impact upon ground or surface water. Water sampling is being done around the site to establish hydrogeological data, and sampling will continue during the course of operation.

The plant is being built on city-owned land. The cost of the plant, with the exception of the recovery system, is borne by the private firm. The resource recovery system is financed by the National Center For Resource Recovery, a non-profit research organization.

The plant will process one-half of the city's waste initially. Two incinerators will be de-commissioned upon completion of the plant.

Some of the profit gained from the sale of recovered materials will be shared by the city of New Orleans.

STATUS

Project completed.

INFORMATION/CONTACT

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Washington, D.C. 20036
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PROJECT/TITLE

Guidelines for Local Governments on Solid Waste Management

CITATION

National Association of Counties Research Foundation, Washington, D.C.

ABSTRACT/SUMMARY

Ten guides have been prepared on solid waste management to assist local elected and appointed policy making officials. These guides cover the following topics; Areawide approaches; Legal authority: Planning; Organization; Design and operation; Financing; Technical and financial assistance; Citizen support; Personnel; and an Action plan and Bibliography.

STATUS

GPO/MF $0.95-NTIS - PB-214 039/0

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Maryland Creates a Statewide Wholesale Sanitary District to Save Her Waterways.

CITATION

N/A

ABSTRACT/SUMMARY

Maryland has enacted a statewide program to coordinate wastewater and solid waste disposal. The Maryland Environmental Service (MEX) will: accept waste from municipalities and corporations, under contract; designate or create regional facilities for receiving and treating their; dispose of the wastes in the purest, most economical and most efficient way; and encourage reduction in the amount of waste generated and discharged to the environment. MES will charge fees for its waste-acceptance service and seek to become self-supporting in six years. MES can issue its own revenue bonds to finance new or improved facilities that hard-squeezed communities have had to pay for on their own. An important aim of MES is to disseminate the technical expertness as well as the financial assistance emanating from Washington, D.C. MES can engage in research and developmental studies and investigations into improved methods and techniques of liquid and solid wastes acquisition, processing, purification, disposal, and management. MES cannot supplant any municipal wastewater purification solid-waste-disposal project that is giving adequate service. The entire state will be divided into service regions. Subsequent to regionalization will be the adoption of a 5-year plan--subject to biennial review--for every service region. To avoid building up overhead, MES expects to use personnel interregionally instead of confining them to a single region. In its statewide focus, and its aim of enhancing the provision of service, MES is comparable to water authorities in Ohio and New York. As a statewide wholesale sanitary district, however, MES breaks new ground.

STATUS

Retained in the SWIRS Library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Regional Planning Models for Solid Waste Management

CITATION

Kuhner, J., and B. Heilet; static LP-model. In models for environmental pollution control. Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1973. p. 344-347

ABSTRACT/SUMMARY

The static average distance Lp-model can be used for today's usual regional transportation and processing problems. It is further generalized to include more of today's recognized processing and disposal alternatives. Engineers and planners should be able to extend the models to include all the alternatives available in regional solid waste management. These models can also be extended to include more constraints. The static LP-model can also be extended and serve as an introduction to fixed charge problems and mixed integer programming. A problem arises when regionalization is contemplated to take over the existing facilities of many independent operations. Some of the existing activities may need to be phased out as economically infeasible, and associated with the phasing out will be costs such as dismantling an incinerator or recultivating over a dump. Considerations of the problems concerning regional solid waste management showed that extensions to the simpler static average location model would be strongly desirable. Unfortunately, many of the desired extensions cannot be solved by an LP but would also require solution by mixed integer programming.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Transport, Scale and Design Options: Design Methods in the Evaluation of Policy Related Research in the Field of Municipal Solid Waste.

CITATION

Hudson, J. F., F. P. Gross, D. G. Wilson, and D. H. Marks. In evaluation of policy-related research in the field of municipal solid waste management. Cambridge, Massachusetts Institute of Technology, Civil Engineering Systems Laboratory, Sept. 1974. p. 145-160

ABSTRACT/SUMMARY

This evaluation of the research on local solid waste management problems was funded by the National Science Foundation and is primarily concerned with residential wastes. While no procedure has been developed which can find the least cost system considering all possible alternatives and all factors which affect cost, several methods exist for finding the best alternative large scale solid waste management system given certain assumptions and the alternatives considered and the cost structure involved in the system. There has, however, been little documented field application of methods. Techniques have been developed which attempt to select the least cost alternatives where only monetary costs are considered. Methods for including social and political objectives offer a potentially valuable aid in facility location, but are still in an early stage of development. Some work has been done which attempts to combine a least cost analysis with input on political and social objectives directly from the decision maker. These methods tend to require an excessive time commitment from the decision maker with little change of worthwhile output other than possibly allowing the decision maker to view tradeoffs between objectives more clearly. Little effort has been made in including capacity expansion considerations for facilities in the location models. Very useful work is, however, available for considering optimal strategies for capacity expansion for facilities with given service areas and growth rates. If regional programs become more popular, these models will have a chance at field verification and further development.

STATUS

N /A

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Developing Local and Regional Solid Waste Management Plan; a Division of Technical Operations Open-file Report (TO 14.0)

CITATION

Toftner, R.O., Developing Local and Regional Solid Waste Management Plan; a Division of Technical Operations Open-file Report (TO 14.0); Cincinnati, Ohio, U.S. Environmental Protection Agency; 1971

ABSTRACT/SUMMARY

This document describes the basic features of the planning process and their utilization in the development of a local or regional plan for solid waste management. The purpose of the booklet is to aid local and regional agencies in preparing comprehensive solid waste management plans. The first part of the document reviews the planning process itself. The essential base studies are listed and discussed. Part III is devoted to management considerations to be included in the planning operation, and management techniques are discussed. Sections are alos given over to implementation of the plan and report preparation. A sample format for reporting the plan is provided, as well as a short bibliography. (D)(G)

STATUS

N/A

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Planning for Solid Waste Disposal: America's Biggest Industry

CITATION

N/A

ABSTRACT/SUMMARY

This publication discusses the following: Planning for solid waste disposal; America's biggest industry: the production of waste; workshops on planning for solid waste management; data for solid waste planning; workshops on data for solid waste planning; intergovernmental cooperation and public involvement in solid waste management; workshops on intergovernmental cooperation and public involvement; solid waste legislation; workshops on solid waste legislation; implementation of solid waste management plans; workshops on implementation of solid waste management.

STATUS

Paper copy available from GPO $0.45 as stock no. 5502-3307, Ep32:P69. Library of Congress catalog car no. 71-611731. E7301

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Intergovernmental Aspects of Environmental Control: Intergovernmental Cooperation--the Use of Interstate Compacts

CITATION

Grad, F. P., G. W. Rathjens, and A. J. Rosenthal. In Environmental control: priorities, policies, and the law. New York, Columbia University Press, 1971. p. 130-146

ABSTRACT/SUMMARY

There has been relatively little intergovernmental cooperation in the area of environmental regulation or enforcement. What intergovernmental cooperation there has been has involved cooperation imposed from the top down, rather than among governments at the same level. This type of relationship is seen in such areas as grant-in-aid programs and atomic energy control. Perhaps the only device for intergovernmental cooperation which has had some experience is the interstate compact. A number of interstate compacts have evolved for the regulation of water pollution. The development of the compact device in the field of air pollution has been much less advanced than in water pollution control, and no air pollution control compacts are presently in effect. The interestate compact device, in spite of the many criticisms that have been leveled against it, is the only workable device for regional pollution control management short of general federal controls. Efforts should be directed to devising interstate compact mechanisms that will meet the criticisms and that will enable interstate compact agencies to function free from the obstacles that the configuration of particular compacts has frequently imposed on such agencies in the past. The role of the Federal Government in encouraging such pacts and in participation in them is discussed.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Managing the Natural Environment; a Regional Plan for Water, Sewage, Air and Refuse

CITATION

N/A

ABSTRACT/SUMMARY

The Tri-State Transportation Commission, representing the States of Connecticut, New Jersey and New York, presents a report dealing with air and water pollution and with the problems of solid waste disposal. Itt is recommended that State leadership establish a regional pattern of solid waste disposal. The main aims are concerned with the protection of public health in all disposal practices and with protection of the environment against damage. Reuse of materials to reduce the solid waste problem is to be encouraged. New low-cost solutions for solid waste disposal problems will be sought. The disposal of waste by means of sanitary landfills is the least expensive method, but sites are not easily available, and exporting refuse to other areas appears next most economical. However, transport cost and social resistance to waste 'imports' are sure to raise further difficulties. It was therefore decided that the best solution would be to develop a regional waste disposal plan that depends on presently used techniques. Landfill sites will not be available for refuse in the metropolitan area; this refuse will therefore have to be incinerated. Collection, cost and organization of this plan are described. (D)(G)

STATUS

NTIS PS 190-290

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Regional Government and Conservation

CITATION

Volume 26 Hournal of Soil and Water Conservation; Beecroft, Eric Mar-Apr. 1971

ABSTRACT/SUMMARY

In bringing professionals and politicians together, regional government takes on a great significance. Knowledge must be assembled and applied to economic development and community building. A strong case is often made for special purpose agencies, to handle each facet of municipal government, rather than having a centralized agency do it all. In Ontario, water, as a resource, is split among several agencies, and many measures have been deferred because of jurisdictional conflicts. The authoirty was not convinced that any broad, long-range project would receive financial assistance from the province. Municipal representatives were not appointed for their ability to form a link between the authority and the grassroots. The Wheatly Commission in Scotland came out for local governments to take over water supply, sewerage, river purification, and flood prevention agencies. The Canadian Federation of Mayors and Municipalities also urged the creation of strong, multipurpose regional governments rather than special agencies. Community finance corporations can be set up for conservation, flood protection, pollution control, and water supply. Provinces and local authorities could be given broader taxing powers. In giving power to regional governments, citizen participation will be increased. (D)(G)

STATUS

SWIRS Library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Total Environmental Quality Management Models

CITATION

In Models for environmental pollution control. Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1973. p. 403-436

ABSTRACT/SUMMARY

Traditionally, gaseous, liquid, and solid waste management problems have been dealt with separately with little or no concern for the other environmental media, such as atmosphere, water courses, and land, into which residuals are discharged. The purpose of this study is to delineate the entire regional residuals management system, including the range of management options available to society for improving environmental quality, and to indicate how all the components of the system may be expressed and ultimately linked together within the same computational framework. A regional residuals management model that includes all the relevant management options available to society for improving environmental quality consists of residuals generation and discharge models, environmental modification models, environmental quality models, damage functions, and management strategies. The management model is formulated quantitatively and mathematical forms of the various environmental models are discussed. An atmospheric dispersion model and an aquatic ecosystem model are included. Computational schemes for selecting an optimal management strategy are suggested.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Michigan Towns Sell Regional Authority Bonds

CITATION

N/A

ABSTRACT/SUMMARY

In 1967, five municipalities in Berrien County, Michigan, with a combined population of 77,000 people, individually took stock of their disposal facilities and concluded that they were faced with a state of emergency. For a number of years, each had been discarding its solid wastes at open dumps situated in swampy river areas, resulting in pollution of the local streams. After studying the costs involved in setting up a sanitary landfill in each of the five regions, it was decided to band together to start a single, common landfill. The Northwestern Berrien County Sanitation Authority was established. The landfill was financed by selling negotiable bonds through the Detroit stock exchange. The Authority hired, a private hauler, to be full time superintendent of the site. To get the operation started a John Deere self-elevating scraper, a small Deere wheel tractor with front end loader, a Clark CS-70 Trash-Pak, and an American Hoist crane and dragline were purchased. Since the site was on flat land, with no natural ravines or hills, converting to a landfill meeting state specifications and also local regulations took a great deal of time and excavating. The disposal trench currently in use is 70 ft. wide, 20 ft. deep and 1,400 ft. long. Its life expectancy is a year to 18 months, which the entire site is expected to last more than a decade. All of the 800 to 900 cu. yd. of household, commercial, and industrial wastes generated in the five municipalities each day must be taken to the Authority's landfill, according to regulations. At the landfill each vehicle is charged/cu. yd. rather than by weight. No one dumps free at the site. Every member of the Authority pays the same rate and there are no discounts for volume.

STATUS

Retained in the SWIRS Library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Intergovernmental Approaches to Solid Waste Management

CITATION

N/A

ABSTRACT/SUMMARY

Solid waste management must be approached according to the concept of an integrated management system within a framework of maximum operational authority. Adoption of this broad approach will frequently require a transcending of jurisdictional boundaries. Consequently, intergovernmental approaches must be taken. Urban, rural, and statewide interstate regions can be related to and modeled on intergovernmental solid waste management groups. Options such as joint powers and services agreements, contractural arrangements, and overall operational organizations incorporating the advantages of authorities, compact, and utilities could be used. Development of an integrated management system includes the organization of the region-wide intergovernmental jurisdiction and an actual operating unit. In planning the system, consideration must be given to finances, manpower, equipment and facilities management, and control and evaluation of the system's operation and performance. Examples of the kind of coordination discussed are given for various levels, and their applicability as guidelines is evaluated. (G)

STATUS

N /A

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Economic Aspects of Regional Versus Local Solid Waste Management

C ITATION

Owens, R. J. M.S. Thesis, University of Washington, (Seattle), 1971. 67p.

ABSTRACT/SUMMARY

The economic considerations in the determination of the optimal area and facility sized for solid waste management systems are examined. Solid waste collection costs do not appear to vary with the size of the area served. Economics of scale exist in all transportation systems when the distances remain constant. The major savings in reported disposal costs occur by enlarging sanitary landfills to 120 tons per day and incinerators to 600 tons per day. Cost evaluation of reclamation processes is not available at this time. Savings obtained by enlarging service areas of treatment, transfer, or disposal facilities must be added to transportation costs to obtain optimum area sizes. The radius of optimum area size was found to decrease with increasing population density, per capita waste generation, and transportation costs. The sensitivity of optimum area sizes to cost variables was also found to decrease with population density. Data are included on the variables affecting collection costs. The factors that influence the design life of a sanitary landfill site are variable and often unquantifiable, but an effort is made to develop equations to determine the optimum life of a site. The computerized determination of optimum area sizes is included.

STATUS

This document is retained in the SWIRS library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

The Utility Concept

CITATION

McGauhey, P.H., Waste Age, The Utility Concept, Volume 2, #3, May-June 1971

ABSTRACT/SUMMARY

The utility concept is the idea that refuse collection and disposal should be regarded as one of the municipal or regional utilities, just as water supply, electric power, and waste water treatment. Although regional plans have been developed for management of air pollution, water pollution and resource utilization, similar actions have not yet been taken in the less glamorous solid waste field. Increasing public consciousness of such concepts as resource recovery may change this image, and place solid waste management higher on the list of government action priorities. Each utility engaged in the solid waste management field would have different authorities and activities. The most common activity would be the operation of a system responsible for refuse collection and transportation to transfer stations. Disposal arrangements would vary, however, under a regional plan where they surely would not consist of merely exporting the wastes into adjacent territory and dumping them, as had been practiced by some municipalities, in the past. The second function would be that of collecting reasonable fees for the services performed. These fees would avoid the usurpation of local privileges. Considering the efficiency and flexibility which the utility concept offers, it is surprising that is has not received much consideration heretofore. (D) (G).

STATUS

SWIRS Library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

The Name of the Game is Service

CITATION

Porter, Robert; Waste Age Vol. 2 #3 Date: May-June 1

ABSTRACT/SUMMARY

Chapter 28E Code of Iowa provides for the creation of regional agencies such as those which are appropriate in solid waste collection and disposal. Under this enabling legislation, the Des Moines Metropolitan Area Solid Waste Agency was set up. Of the municipalities in the area, only the city of Des Moines has turned over its solid waste management to the agency, but others are negotiating to do so. Only residential refuse is handled, and a fee of from $2 to $8 per residence is charged. Larger buildings and industrial establishments are serviced by private contractors. The agency acquired the city landfill site and all the equipment used by the city when collection was transferred to its jurisdiction. Personnel, too, was transferred and offered the same benefits as the city has provided. Since the Landfill must be self-supporting, rates have been raised to $.50 per cu. yd. At the new site, charges will be made by the ton. Members of the agency are now free to leave at any time, although after revenue bonds are issued to purchase land and equipment this will no longer be true. Most of the area towns realize that the ultimate solution to solid waste disposal problems is a regional agency, and now that the agency is operating within its budget and providing good service, it will undoubtedly grow.

STATUS

N/A

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Service Areas

CITATION

Roy F. Weston, Environmental Scientists and Engineers, A Statewide Comprehensive Solid Waste Management Study; Albany, New York; N. Y. State Department of Health; Feb. 1970

ABSTRACT/SUMMARY

The advantages of regionalization are lower unit costs, better operation, more effective site selection, more thorough preplanning, and a sounder basis for financing. Inability to obtain cooperation between municipalities has hampered any plans along these lines. In order to achieve regionalization, the State will have to take responsibility for promoting it. The term 'service area' has been chosen to designate a portion of the State for which cooperative solid waste effort is appropriate. The most important objective in delineating a service area is to realize the least cost consistent with the most effective and manageable disposal means. A list of selected State-owned lands indicates that 27 percent of them would be needed for disposal of solid wastes. Tables are presented for service areas, acreage requirements for disposal of future wastes by sanitary landfill, operating costs of future landfill sites, and projected land requirements. (D)(G)

STATUS

SWIRS Library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

The Problem that Won't Go Away

CITATION

The Problem that Won't Go Away; New York State Dept. of Health;

ABSTRACT/SUMMARY

Suffolk County's solid waste disposal is splintered among more than a dozen separate jurisdictions at various levels; county, town, village, state, and federal institutions. Local jurisdictions have not had the means for the planning and record-keeping that growth now demands for Suffolk. Essential functions can be accomplished most effectively and most economically at the central level. A plan has been developed for regional control and administration of solid waste disposal. Adoption of practical, modern methods for reducing the volume of waste and disposing of it is an important aspect of the plan. An overall program for improvement and extension of existing disposal facilities is needed. Coordinated regulations, record-keeping, and monitoring would benefit the county. It is estimated that proposed new refuse facilities, plus operation and improvement of existing facilities will cost property owners an average of 49¢ in property taxes/$100 of assessed valuation over the next 25 years.

STATUS

SWIRS Library # Accession #7644

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Land Use and Industrial Site Selection

CITATION

Varin, Daniel W; Recent Developments in Industrial Pollution Control; Proceedings of the Fourth Annual Northeastern Regional Antipollution Conference, University of Rhode Island. July 13-15, 1971; Technomic Publishing Co.

ABSTRACT/SUMMARY

Planning for industrial growth is part of the State plan for the State of Rhode Island. Economic well-being for its residents is one aim of the State, and its goals in this area are to improve opportunities for maximum productive employment through continued industrial development, to make full use of manpower development resources, to reduce unemployment and underemployment, and to increase real and disposable income. In the realm of industrial site selection, Rhode Island intends: to make efficient use of available land to promote a pleasing, coherent, and workable environment; to stabilize older central cities; to control urban sprawl and dispersion; to reduce urban blight; to sustain economic growth at the maximum rate consistent with regional resources; and to reduce stream pollution to levels set in the State's water quality classification plan. The guide designed to implement the plan provides for the public facilities needed to support the proposed land use pattern. The industrial site chosen were selected with consideration of utility services, transportation, soil, topography and drainage, and compatibility with existing land use. The plan allocates about 30 sq. miles to all industrial purposes, as compared with 10 or 11 sq. miles in use now for industry. (D)(G)

STATUS

This document is retained in the SWIRS library

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Areawide Approaches

CITATION

Guidelines for Local Governments on Solid Waste Management. Public Health Service Publication No. 2084; Washington, D.C.; U.S. Gov. Printing Office; 1971

ABSTRACT/SUMMARY

An areawide approach to solid waste management will insure a comprehensive program. Evidence of solid waste mismanagement can be found in pollution of land, water, and air. These pollutions must be seen as interrelated. An areawide approach should include the widest feasible geography and be projected for disposal sites to last for 20 years. County governments and metropolitan councils of government are examples of such areas. In some places special districts set up for purposes such as taxing can perform the function of the areawide government. State action in areawide programs thus far has mainly been in technical assistance. Intergovernmental cooperation can be accomplished in a variety of ways: formal or informal agreements, contract, joint management, or transfer of function. (D)(G)

Areawide planning is the responsibility of local elected officials. Planning must be accepted by the citizens and be in accord with basic State requirements. The first step in the planning process is collecting data on physical factors, population and land use, solid waste types and quantities, and regulations. Systems analysis can be a useful tool in interpreting information. Implementation requires capital budgeting and active support. A list of solid waste planning agencies in each State with addresses is included. (D)(G)

STATUS

This document is retain in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Regionally Consolidated Industrial Wastewater Treatment

CITATION

National Industrial Pollution Control Council; 34 pages; Washington, D.C.
U.S. Government Printing Office; Feb. 1971

ABSTRACT/SUMMARY

This booklet discusses the regional waste water treatment plants as a solution for industries which must clean up their effluents before discharging them into waterways. An attempt will be made to identify the range of technical, economic, and social issues that pertain to the disposal of waterborne wastes of a regional grouping of industries and possibly one or more municipalities. The critical issues that must be resolved before industries can and will join in such regional programs are noted. The system is described from a theoretical viewpoint and then evaluated in terms of the alternative available to two geographical areas, the San Francisco Bay-Delta and the Cuyahoga River in Ohio. The specific costs, environmental implications, and institutional requirements involved in these two areas are dealt with.

Environmental quality models are included in the booklet.

STATUS

This document is retained in the SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Criteria for Regional Solid Waste Management Planning

CITATION

B. H. Stevens, Regional Science Research Institute, Philadelphia, Pa.

ABSTRACT/SUMMARY

This report consists of a collection of studies on selected aspects of the problem of regional solid waste management planning. The research efforts fall into three main subject areas; the economics of solid waste generation, recycling, and disposal, the economic and social effects of landfills, and the issues involved in local-intergovernmental cooperation for regional solid waste management. The individual studies are the following: "A Framework for Evaluating the Economic Effects of Regional Solid Waste Generation Coefficients; Manufacturing Sectors", Solid Waste Generation Coefficient; Non-Manufacturing Sectors", Preceptions of Landfill Operations Held by Nearby Residents", and "Efforts at Intermunicipal Cooperation for Solid Waste Disposal. Whey They Fail". The report also includes a summary of the studies.

STATUS

Publication available. NTIS-PB 239631 $9.50

INFORMATION/CONTACT

Talley, R.J.
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Environmental Protection Agency
Cinn., Ohio 45213

PROJECT/TITLE

Lee County Solid Waste Management Project

CITATION

N/A

ABSTRACT/SUMMARY

Solid waste disposal in both the incorporated municipalities and rural areas of Lee County was unsatisfactory. The City of Tupelo made an attempt at operating a sanitary landfill in an undesirable location. With poor operation, the results were open burning, water pollution, and insect and rodent production. Disposal sites for other areas of the county were nothing more than open dumps. Garbage and rubbish collection was provided by the City of Tupelo, the towns of Nettleton and Saltillo, and by one private collection service. The citizens of the other towns hauled away their own solid wastes. Garbage storage is known to be very poor at most of the homes in the small towns. The prime objective of the project was to demonstrate the feasibility of a county-wide plan for solid waste management. A centrally-located sanitary landfill near Tupelo was operated by the county for disposal.

The solid waste management project was successful, and, as a result, most counties in Mississippi are now using a system of mobile containers.

The wells around the landfills are continuously monitored. To date, there has been no evidence of leaching.

STATUS

The final report was sent to EPA in 1/74.

INFORMATION/CONTACT

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703 Crossover Road
Tupelo, Miss. 38801
601-842-7381

PROJECT/TITLE

Evaluation of Feasibility and Economic Implication of Pricing Mechanisms in Solid Waste Management

CITATION

E. Ernest, ABT Associates, Inc. Cambridge, Mass.

ABSTRACT/SUMMARY

This study analyzes the potential of pricing mechanisms in solid waste management systems. Such pricing mechanisms have been suggested as appropriate means for encouraging greater efficiency of resource, both within the solid waste management system proper and among sources of solid wastes. The study reviews the limited empirical evidence concerning supply and demand characteristics in markets for solid waste management (primary collection) services. The analysis of processing and disposal and ancillary Solid Waste Management services is hampered by the diversity of existing systems, and remaining problems in the conceptual clarification of the services provided. The analysis of cost functions in the Collection and Transportation subsystem suggests that these cost functions are subject to variable returns to scale. For smaller communities, there are economies of scale with respect to the amount of waste handled. For larger communities, scale effects vanish. The available literature provides sufficiently strong evidence for the importance of both prices (and pricing policies) and incomes as determinants of the amount of waste collected per household. This evidence is used in an exploratory numerical analysis employing decision-theroetic elements to assess the likely impact of pricing mechanisms. The analysis suggests that total system costs could be reduced through pricing mechanisms, even though there would be a tendency to rely more on self-disposal as prices for collection services increase. The study concludes with a brief suggestion for a feasible method for implementing an effective pricing mechanism in SWM systems.

STATUS

Publication available. NTIS PB 239116/AS $4.75

INFORMATION/CONTACT

Goddard, H. C.
513-684-4484
EPA - Cinn., Ohio 45213

PROJECT/TITLE

Intergovernmental Aspects of Environmental Control: Problems Presented by Legal and Administrative Arrangements--A Critical Recapitulation

CITATION

F. P. Grad and G. W. Rathjens, and A. J. Rosenthal

ABSTRACT/SUMMARY

One of the major problems that the present pattern of rule-making and enforcement in environmental law presents to effective environmental management is the lack of a unified policy and the disjunctiveness of regulatory and enforcement activities. There is no integrative principle that in some way ties the Federal and State development programs into the State and Federal environmental control effort. Also, present legislation too often separates the responsibility for rule-making and standard setting from the responsibility for enforcement by lodging them at different levels of government, thus rendering the regulatory effort less effective.

In the planning for effective environmental controls, the appropriate level of government to make policies and rules and to carry out or enforce them must be considered. The question involves the proper size of government's territorial jurisdiction if it is to operate effectively in the control of environmental pollution. The issue is not only what level of government should appropriately regulate the problem, but whether the policy-making and standard setting functions need to be the responsibility of the same level of government that is primarily responsible for enforcement.

The provisions of the National Environmental Policy Act of 1969 are reviewed and the powers and actions of Council of Environmental Policy are discussed. The effects of environmental impact statement on pollution control are examined. The agencies and functions now combined in EPA are identified, and the problems related to the creation of the agency are described.

STATUS

SWIRS library.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Framework for Analyzing and Selecting Among Alternatives for Regional Solid Waste Management

CITATION

N/A

ABSTRACT/SUMMARY

Considerable interest and suggestions concerning economies of scale in regional solid waste management systems have been expressed. The economic feasibility of regional solid waste management was investigated. Primary emphasis was on the development of a model framework to facilitate analysis and selection among alternatives for regional solid waste management systems, including implications for regional economics.

STATUS

Publication available from NTIS - PB-239 631

INFORMATION/CONTACT

B.H. Stevens
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PROJECT/TITLE

NEC Environmental Impact Study

CITATION

N/A

ABSTRACT/SUMMARY

Appropriate measures of environmental impacts were defined for each pollution category and type pollutant--air, water, solid waste, noise, thermal, radiation, and land use. Methodology was developed for projecting north east corridor (NEC) impact levels to 1985 that incorporate key variables as population growth and density, and currently planned programs for pollution and environmental control. Extent of total environmental impacts stemming from NEC transportation activities was isolated and evaluated in light of total problem. Consequences of alternative transportation programs and policies for the NEC will be examined as a way of improving the environmental quality of this region.

STATUS

Document provided to S.S.I.E. by the H.R.I.S. Information Service
Completed. Copy available at cost of printing.

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Environmental Carrying Capacity As A Concept In Comprehensive Regional Planning - A Feasibility Study

CITATION

N/A

ABSTRACT/SUMMARY

In response to the need to better understand the impacts of development and management activities across entire regional systems, this research examined approaches for measuring and understanding the capacity of regional environments to absorb or support activities in such areas as resource use, land development, waste disposal, transportation, wildlife and watershed management. The focus was upon environmental carrying capacity of regional systems and subsystems as a concept for assessing changes in environmental quality due to large-scale development, management and planning activities, and as a basis for planning and decision-making models and methods. In this regard, efforts were made to define and develop indicators for measuring carrying capacity, to identify approaches for defining and describing a region, to identify parameters necessary to design and implement models of regional carrying capacity, to assess data requirements and strategies for data collection and management, to indicate procedures for validating or testing potential models, and to identify facilities, personnel, and estimated costs for model development.

STATUS

Project completed. Publication: EPA # 600/5-74-021

INFORMATION/CONTACT

Prof. A. B. Bishop
Utah State University/School of Engineering
Office In Engineering, Room L50
Logan, Utah 84321

PROJECT/TITLE

Joint Siting of Electrical Power Plant and Advanced Wastewater Treatment Plant Feasibility Study

CITATION

N/A

ABSTRACT/SUMMARY

Description: The purpose of this study was to evaluate five advanced wastewater treatment (AWT) plant sites and various treatment processes, including land disposal and sludge. Joint siting of an electrical power plant and an AWT plant was considered because of the possibility or reducing the overall environmental impact as compared to separate siting. Alternatives affiliated with the power plant include the following: location of the AWT plant at the power plant site, using clear effluent as make up to the power plants cooling towers and burning the AWT plant's organic solids in the power plant's furnaces; locating the AWT plant at a lower basin site with clear water transmitted to the power plant and alternate methods sludge disposal; land disposal of sludge in connection with the power plant's use of partially treated wastewater. The study concludes that to meet the quality standards, for discharges into the Potomac River, treatment processes are limited to AWT or land disposal. Land disposal requires considerably more land than an AWT plant and would consequently cost more and displace more families. For those and other reasons, an AWT plant is recommended. The joint location of the AWT plant and the power plant proved to have many advantages and to be entirely feasible and acceptable from the technical, economic, and environmental viewpoints. However, due to community reaction and sociopolitical factors, the joint siting project was rejected by the governing body. Plant is under design and is nearly completed. Construction is scheduled for next year. (1976)

STATUS

A detailed environmental impact study of an Areawide Waste Treatment and Delivery System for Montgomery County, Md. was done by Battelle Memorial in August 1974. Region III is working to complete a similar draft for the Region III area.

INFORMATION/CONTACT

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Region III

PROJECT/TITLE

Comprehensive Studies of Solid Waste

CITATION

Annual reports nos. 1 and 2 Colueke, C. G.; McGauhey, P.H. California University Berkeley. 1970; 480p.

ABSTRACT/SUMMARY

The contents of this publication are as follows: data collection and evaluation: (literature survey and information retrieval; characteristics and amounts of solid wastes; waste generation in Santa Clara County; definition and coordination of research areas); waste generation and evaluation model; waste collection-treatment-disposal model; waste generation input and management system inputs; planning and economics; (development of pertinent data on quantity and types of solid waste) solid waste generation and land-use planning.

STATUS

Available from NTIS-Pb-218 265 $0.95 GPO/MF

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Projects in the Industrial Pollution Division - December 1974

CITATION

Industrial Pollution Pollutant Control Division, EPA Washington, D.C.

ABSTRACT/SUMMARY

Project of the Industrial Pollution Control Program-December 1974 is a compilation of information sheets from projects initiated since fiscal year 1967 through fiscal year 1974. Each sheet contains the objectives, statistical information, and a brief description of the project. General introductory information on the Federal Industrial Pollution Control Program is also presented to provide perspective on the magnitude of industrial pollution and the research directions that must be pursued in order to develop the technology to adequately control this largest point source of pollution in the United States.

STATUS

Publication Pending. #600/2-75-001

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Solid Waste Disposal Economics. A Bibliography with Abstracts. Rept. for 1970 - Sept 74.

CITATION

National Technical Information Service, Springfield, Va. Nov. 74; 92p.

ABSTRACT/SUMMARY

The bibliography contains 76 selected abstracts of research reports retrieved using the NTIS on-line search system-Ntisearch. The topics include all aspects of the economics of solid waste disposal and abatement, including studies concerning industries, transportation, urban planning, and recycling.

STATUS

NTIS ps-74/092 pc $2.00/MF $20.00

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Urban Solid Waste Management

CITATION

Lehmann, Edward J., National Technical Information Service, Springfield, Va.

ABSTRACT/SUMMARY

This bibliography contains 142 selected abstracts of research reports retrieved using the NTIS on-line search system--Ntisearch. The topics selected cover all aspects of solid waste management for urban areas. The reports include economics, collection methods, recycling, sanitary landfills, and urban planning.

STATUS

Available from NTIS/ps 74/105 pc $20.00/MF $20.00

INFORMATION/CONTACT

N/A

PROJECT/TITLE

Areawide Refuse Disposal

CITATION

Areawide Refuse Disposal, O'Toole, Michael J., Troy, N.York, Rensselaer Polytechnic Institute, 1/ 1970

ABSTRACT/SUMMARY

Nine areawide comprehensive refuse reports covering many counties of various populations, economic make-up, and development were analyzed. The basic facts, needs, and relationships most often found to be essential in the master planning, development, and implementation of programs to handle refuse problems economically and efficiently were determined. Governmental units by examining the material developed, may gain insight into the means of going about solving their own particular refuse problems. The study reports point out the major economical, operational, and administrative advantages of refuse disposal operations conducted on an areawide basis. Consequently, areawide or regional refuse disposal operations were most often recommended; the recommendations, however, have proven somewhat difficult to implement. The study showed that refuse collection is usually by one of three common methods, namely municipal contract, or private collectors. The use of the uncontrolled "dump" is still the most commonly used disposal method. Refuse collection can be handled best if left at the local level. Refuse disposal and transfer operations can be handled most economically and effectively on an areawide basis. The sanitary landfill because of its economy, is the most often recommended method of refuse disposal. At the present time the county is the unit of local government best equipped to control and administer areawide refuse disposal operations though regionalization will evolve from properly functioning county operations.

STATUS

SWIRS Library.

INFORMATION/CONTACT

N/A

REFERENCES

National Technical Information Service - Abstracts

Office of Research and Development Publications Summary (EPA)

Office of Solid Waste Management - Available Information Materials Catalogues

Smithsonian Science Information Exchange - Summaries of Research

OTHER BIBLIOGRAPHIC REFERENCES

I. SLUDGE DISPOSAL

A. WATER TREATMENT SLUDGES

Davis, H.R., Jewell, W.J. and Johndrew, O.F.
"Egg Breaking and Processing Waste Control and Treatment"
PB-245 588/9S1 Mar. 1975

Eleven percent of the eggs produced in the U.S. are handled by egg breaking facilities to produce more than 800 million pounds of various egg products annually. Five egg breaking plants were sampled which covered a size ranging from small installations to one of the largest. The wastewater was highly contaminated, with total COD exceeding 6000 mg/l or greater. The product loss average was 12.5 percent of the weight of the processed product. Unit process losses were 0.034 kg BOD D sub 5 and 7.5 liters per kg of egg liquid produced. In-plant waste conservation methods were demonstrated to decrease BOD 5 and wastewater volume losses by 50 and 24 percent, respectively. These reductions in product loss resulted in recovery of product with a value between $250 and $500 per day for a medium sized facility. Aerobic lagoons with 30 day HRT reduced the total COD from 5800 mg/l to 1000 mg/l. Of the four treatment systems tested, only a combination of an anaerobic lagoon followed in series with an aerated lagoon and a liquid solids separation step produced a dischargable effluent with soluble BOD D sub 5 less than 15 mg/l.

Duvall, D.S. and Hecht, N.L.
"Characterization and Utilization of Municipal and Utility Sludges and Ashes"
PB-244 310/9SL May 1975

The nature and disposal practices for municipal and utility sludges and ashes were studied. The study was primarily concerned with the sluges from municipal waste water, and water treatment plant, coal ash from power stations and grate residue from municipal incinerators. Each of these subject areas is presented in a separate report. Volume 1 of this series presents the summary for the results and conclusions developed for each of the subject areas.

Hoffsomer, John C. and Kaplan, Floyd A.
"Removal of Explosive Materials From Water by Chemical Interaction on Strongly Basic Ion Exchange Resins"
AD-D002 301/OSL Jan. 1976

This patent application pertains to hydrolyzable, non-aromatic, nitroso- or nitro-substituted explosive compounds which are removed from water by adsorption of the explosive on a strongly basic anion exchange resin, and by chemical interaction of the adsorbed explosive with the anion exchange resin to produce relatively non-toxic products. This is an effective method for the quantitative removal of explosive material from water which also solves the problem of disposing of the explosive once it is removed from the water so that it does not cause a pollution problem.

Kawam, A.; Smith, L.M.
"Feasibility of Using - Sewage Sludge in Highway
Embankment Construction Interim Report"
PB-242 260/8SL Feb. 1975

A laboratory evaluation of the feasibility of using sewage sludge in construction of a highway embankment was conducted. Mixtures composed of lime, fly ash, waste calcium sulfate and up to 17% sewage sludge were evaluated. The effect of lime type, fly ash source and the relative proportions of lime, fly ash and waste calcium sulfate on compressive strength of compacted specimens was measured. Two soils, one sandy and the other clayey, were used to replace 30, 50 and 70% of the fly ash in selected formulations. All samples with the soil replacement exceeded the minimum strength gain criterion. Selected formulations were further evaluated for volume change, durability, permeability and leachability. Analysis of the leachate from the permeability tests indicated that the heavy metals present in the sewage sludge--cadmium, chromium, mercury and zinc--were retained in the misture.

Neptune, M. Dean
"Demonstration of a Planning Perspective for Waste
Water Sludge Disposition"
PB-250 684/8SL Jan. 1976

This study is an investigation of the wastewater treatment and sludge disposal methods of 18 plants in the Ohio-Kentucky-Indiana region as a means of testing an application of a methodology previously developed by the EPA. The plants selected for analysis represent about 80% of the total treatment capacity of the region; individual plant capacities range from 35,000 to 120 million gpd (133 to 456,000 cu m/d. In application of the methodology, various sludge management alternatives are analyzed in terms of technical feasibility, costs, environmental impacts, sociopolitical implications, and other factors pertinent to regional-scale planning.

Princiotta, Frank T.
"Sulfur Oxide Throwaway Sludge Evaluation Panel";
Vol. I: Executive Summary.
PB-242 618/7SL April 1975

Contents: Definition of the problem-Availability of alternative SOx control technology. Potential demand for lime/limestone scrubbing. Quantification of the problem and comparison with analagous environmental problems. Relationship between sulfur oxide scrubber sludge, standards/regulations, and enforcement. Nature of the material. References. Approaches to disposing of or utilizing.

B. DOMESTIC WASTEWATER/SEWAGE

Laird, Tony; Levin, James; Scofield, Francis
"Assessment of Industrial Hazardous Waste Practices, Paint and Allied Products Industry, Contract Solvent Reclaiming Operations, and Factory Application of Coatings"
PB-251 669/8SL Sept. 1975

This report describes the hazardous waste practices in the paint and coatings manufacturing industry, solvent reclaiming operations, and factory-applied coatings facilities. Site surveys of 70 paint plants showed that raw materials packaging, cleaning, wastes, dust from air pollution abatement equipment, and waste product are the major process wastes which are generated. Approximately 105,000 tons per year were determined by the contractor to be potentially hazardous due to either the oral toxicity or flammability of waste constituents. The vast majority of the paint industry wastes are combined in a single waste handling system and discarded in off-site landfills by private contractors. The best technology currently applied along with the technology required to provide environmentally adequate treatment and disposal for each waste stream are also provided in the report along with attendant costs. Contract operators reclaim about 270 kkg (300,000 tons) per year of waste organic solvents generated by the manufacture of paint and coatings, metals finishing, degreasing operations, etc. Distillation and evaporation units generate still bottoms as a process waste which represents roughly 25 percent of the feedstock. Most of the still bottoms is incinerated with the ash deposited in landfill. Roughly 45,000 manufacturing establishments have attendant coatings operations in this country. Wastes are generated and, in general, transported by contractors to off-site landfills.

McGhee, T. J.
"Upflow Filtration of Oxidation Pond Effluent Completion"
PB-243 529/5SL June 1975

An upflow filtration system employing a sand medium was constructed and operated at the Municipal Oxidation Ponds in Lincoln, Nebraska. The system was operated at loading rates of 0.5 to 3.0 gal/sq. ft/min (6.25 to 37.5 gal/min) and backwashed at a rate of approximately 15 gal/sq. ft/min (190 gal/min). Flow was provided by electrically driven centrifugal pumps. Routine data measurements included COD and suspended solids of influent and effluent and BOD of influent and effluent when the solids concentration in the effluent met current discharge standards. Modifications to the system made during the study included the addition of a steel grid to restrain the filter medium against premature expansion and substitution of a coarser sand (.5 mm) for that originally used (.22 mm). Conclusions were: (1) the suspended solids and BOD of oxidation pond effluent may be reduced by filtration through a sand medium; and (2) efficiency of removal decreases sharply with increased filtration rate.

C. INDUSTRIAL SLUDGES

Contos, Gayaneh; Durfree, Robert L.; Hackman, E.E.
"Assessment of Wastewater Management, Treatment Technology, and Associated Costs for Abatement of PCB's Concentrations in Industrial Effluents"
NTIS Accession No.: PB-251 433/9SL Jan. 30, 1976

This document presents the findings of a study of available wastewater management and treatment technology for the purpose of determining toxic pollutant effluents concentrations and daily load achievable in three industrial categories: polychlorinated biphenyls (PCBs) manufacturing; capacitor manufacturing; and transformer manufacturing. All plants in the above categories have PCB discharges to either waterways or sewage treatment plants, under normal operating conditions. All plants have discharges to storm sewers or directly to waterways under heavy rainfall conditions. For scrap oils and burnable solid wastes generated at these plants, high temperature, controlled incineration offers a straight forward method of destruction, whereas scientific landfilling appears to be the best suited mode of disposal for nonburnable contaminated solids. Zero discharge objectives can be best achieved by eliminating discharge streams and developing recycle systems. All non-contact cooling water would be segregated, cooled, and recycled. All other wastewater streams would be pretreated. The portion of the pretreated water which would be used in the plant would be treated with carbon, while the excess water would be incinerated in a specifically designed system which would allow for energy recovery. Supporting data, rationale for the selection of above recommended treatment technologies and associated costs are contained in this report. Even some on air pollution control is discussed along with the other pollution factors.

Smith, Mona F.
"Hazardous Material Waste Disposal (A Bibliography with Abstracts)"
Springfild National Technical Information Service,
Jan. 1964 - Dec. 1974.
NTIS Accession No.: NTIS/PS-75/285/7SL

Topics include disposal of pesticides, explosives, chemical warfare agents, dangerous industrial chemicals, and other types of hazardous materials. The 92 abstracts cite research on management planning.

Lehmann, Edward J.
"Synthetic Fuels from Municipal, Industrial, and
Agricultural Wastes (A Bibliography with Abstracts)"
Springfield: National Technical Information Service,
August 1975
NTIS Accession No.: NTIS/PS-75/655/1SL

The bibliography covers research efforts aimed at aspects of producing synthetic fuels--gases and liquids--from solid wastes. These wastes include manure, sewage, paper and wood. In most citations, methane is the primary fuel produced; however, the production of oils, ammonia, carbon monoxide, and methyl alcohol is also discussed. (Contains 36 abstracts).

Des Rosiers, Paul E.; Fitzsimmons, Charles K.;
Ouffut, Carolyn K.; and Wastler, T.A.
"Maritime Administration Chemical Waste Incinerator
Ship Project". Washington: Environmental Protection Agency,
July 1975.
NTIS Accession No.: PB-246 728/OSL
EPA Accession No.: EPA 430/9-75/014

The first officially sanctioned incident of ocean incineration in the United States occurred abord the M/T Vulcanus in the Gulf of Mexico from October 1974 through January 1975. This report describes the monitoring activities undertaken to evaluate ocean incineration as a disposal method. A total of 16,800 metric tons of waste were incinerated at a maximum rate of 25 metric tons per hour with a 1200C minimum and a 1350C average flame temperature. Stack gas emissions were monitored for plume dispersion characteristics and to determine combustion efficiency. The findings indicate that more than 99.9 percent of the wastes were oxidized. Marine monitoring surveys indicate that there were no measurable increases in concentrations of trace metals and organochlorides in the water and marine life.

Minnesota Pollution Control Agency. "Chemical Waste Land Disposal Facility Demonstration Grant Application". Washington: Environmental Protection Agency, 1976.
NTIS Accession No.: PB-249 747/7SL
EPA Accession No.: EPA/530/SW-87d

The U.S. Environmental Protection Agency has awarded the Minnesota Pollution Control Agency a grant to demonstrate land disposal techniques for potentially hazardous chemical wastes (solids, sludges, and slurries). This document presents the demonstration approach as it is proposed in the grantee's application. The application identifies and discusses: work tasks, potential facility designs, personnel needs, budget needs, contractor/ consultant arrangements, implementation procedures, evaluating and reporting procedures, and the existing regulatory framework.

Gruber, Gerald I. "Assessment of Industrial Hazardous Waste Practices, Organic Chemicals, Pesticides, and Explosives Industries". Washington: Environmental Protection Agency, April 1975.
NTIS Accession No.: PB-251 307/5SL
EPA Accession No.: EPA 530/SW-118c

The objectives of this study were to determine, for the manufacturers of industrial organic chemicals, pesticide preparations and formulations and explosives: (1) the quantities and geographic distributions of land-destined hazardous wastes, (2) present practices for treatment and disposal of land-destined hazardous wastes, (3) commercial control technology which could be applied to reduce the hazards presented by disposal of such wastes, and (4) the cost of present practices and the applicable commercial technology.

II. SOLID RESIDUAL WASTE DISPOSAL

A. PROCESSED WASTES - INDUSTRIAL

Alfredson, P.G.; Levins, D.M.
"Radioactive Waste Management".
S.D.C. Accession No. - AAEC/IP-3 Aug. 1975

Abstract: See NSA 3301, number 01394

Antonczyk, R.
"Interactive Program for Managing a Storage
for Radioactive Waste".
S.D.C. Accession No. KFK-2124 March 1975

Abstract: See NSA 3205, number 12247.

II. SOLID RESIDUAL WASTE DISPOSAL

A. PROCESSED WASTES - INDUSTRIAL

"Disposal of Waste or Excess High Explosives Progress Report",
July - September 1975
S.D.C. Accession No. MHSMP-75-52

Progress during April to July 1975 in research on the disposal of waste high explosives is reported. Evaluation of the full-scale test incinerator (closed-pit, batch-type) at the ERDA Pantex Plant continued. Air and I-beam temperature levels during combustion were acceptable. Surface temperatures within the incinerator created by radiated heat are high, resulting in a high temperature gradient both in the I-beams and the concrete walls. The I-beams deflected elastically as much as 2.5 cm. Venting (the release of flames above the same filter bed) was observed only for burn rates in excess of oxygen.

Klett, R.D.
"High Level Waste Melting Experiment".
S.D.C. Accession No. SAND-75-5294 1975

An overview is given of the Deep Rock High Level Nuclear Waste Disposal Process (DRD) and the first medium scale demonstration test (DRD-1). The DRD process consists of placing solidified high-level waste (or mixtures of high and low-level waste), either uncontained or in expendable containers, in holes several kilometers deep which are drilled into bedrock. With the holes 0.3 to 3 m in dia. the radioactive decay heat would melt and mix the waste and surrounding rock. After resolidification in 5 to 20 years, the waste/rock matrix would form a dilute, low surface area, low leachability solid plug permanently emplaced several kilometers below the earth's surface. Progress to date in identifying and developing DRD technology has centered aground the DRD-1 test. In this experiment, a waste simulant was electrically heated to 1320 exp 0 C in a 1 m by 0.15 m dia. cavity in a block of dolerite rock. The presence of convection and mixing were confirmed and the thermal model of the test was verified. The leachability of the resolidified rock/simulant matrix was low, and the experiment hardware survived the test environment. A scale-up of this test should be possible. Although the DRD concept has not been proven feasible, progress to date indicates that further study is warranted.

Szlachtun, Andrew J.
"Disposal of Spent Batteries and the Feasibility
of Reclaiming Their Components".
S.D.C. Accession No. AD-A013 519/4SL May 1975

Spent and new dry cell batteries were buried in loam and sand, and in acidic and near neutral to slightly basic conditions. Water was poured periodically over the burial site and the leach was analyzed for heavy metal ion concentrations by means of atomic absorption spectroscopy. Test data and industry contact show that there is no serious pollution problem associated with the disposal of carbon-zinc dry cell batteries other than their bulk. The batteries should be disposed of along with other trash. In sanitary land fills. When large quantities of batteries are discarded, they should be buried at a site that is well drained, above the ground water table, and in calcareous earth or in areas amended with lime. Recycling or dry cell batteries was found to be economically unfeasible at this time.

Warren, J. L.; Wheeler, M. L.
"Tritium Containment After Burial of Contaminated Solid Waste".
S.D.C. Accession No. LA-UR-75-1109 1975

The Los Alamos Scientific Laboratory has used on-site shallow earth burial as the means of disposal of solid radioactive wastes generated in various research and development programs since the mid-1940's. Migration of tritium from its burial ground location was detected at the presently active disposal site in 1970. Research at that time identified asphalt as a material capable of slowing or limiting migration from waste. Since then attempts have been made to contain with asphalt most of the tritium in waste disposals. The actual effectiveness of the asphalting techniques used to contain tritium in solid wastes disposed of by burial are discussed, and mechanisms by which tritium has migrated from burial sites are identified.

B. NON-PROCESSED WASTES

1. INSTITUTIONAL

Rigo, H.G.; Hathaway, S. A.
"Technical Evaluation Study: Energy-Recovery
Solid Waste Incineration to Naval Station Mayport, Florida."
S.D.C. Accession No. AD-A015 615/8SL Feb. 1975.

This study was undertaken to assess the feasibility of energy-recovery incineration of solid waste at Naval Station Mayport, Florida. It was found that use of solid waste as a fuel for steam generation at Naval Station Mayport is technically and economically feasible and environmentally compatible. The recommended system employs a clean-fuel fired, basket-grate incinerator in series with an energy-recovery train consisting of an afterburner and boiler. The afterburner fires fuel reclaimed at an on-station bilge and fuel tank waste oil treatment facility. Refuse-derived fuel (RDF) is fired one shift, five days per week, with the auxiliary burner assuming the load during nights and weekends. Production of 22,700 pounds of steam/hour can be achieved. The benefit-to-cost ratio on this system is 8:1. Through implementation of this system a net fuel savings of 345.800 gallons/yr can be achieved, excluding the amount of the reclaimed oil used. Design criteria are provided.

Smith, Mona F.
"Sanitary Landfills (A Bibliography with abstracts).
NTIS Accession No. NTIS/PS-75/676/7SL Aug. 1975

The reports cited relate to sanitary landfill criteria, site selection, management, ground water pollution effects, waste transportation and case studies for individual cities and regions. (Contains 194 abstracts)

Waldrip, David B.
"The Effect of Sanitary Landfills on Water Quality in Southern Indiana".
NTIS Accession No. PB-249 295/7SL April 1975

A major environmental issue associated with sanitary landfills is the possibility that decomposition of buried solid waste may cause deterioration of water quality. This research was undertaken to evalute the degree of water quality change that may be expected by operating a sanitary landfill in southern Indiana. Three landfill sites were selected for study. The Monroe County and Brown County landfills are in dissected terrain with a surface cover of loess and/or alluvium overlaying Borden siltstone, while the Columbus landfill is located in the White River flood-plain. A detailed geologic and hydrologic investigation was conducted at each site to evaluate any water quality changes caused by landfilling.

Babad, H.; Dressen, A. L.; Hobbick C.; and
Schulz, W. W.
"Glass Forms for Immobilization of Hanford Wastes".
Richland: Atlantic Richfield Hanford Co., March 1975
NTIS Accession No.: March 1975

Approximately 140 million liters of solid salt cake (mainly NaNO sub 3), produced by evaportation of aged alkaline high-level liquid wastes, will be stored in underground tanks when the present Hanford Waste Management Program is completed in the early 1980's. At this time also, large volumes of various other solid radioactive wastes (sludges, excavated Pu-contaminated soil, and doubly encapsulated exp 137 CsCl and exp 90 SrF sub 2) will be stored on the Hanford Reservation. All these solid wastes can be converted to immobile silicate and aluminosilicate glasses of low water leachability by melting them at 1100 exp 0 to 1400 exp 0 C with appropriate amounts of basalt (or sand) and other glass-formers such as B sub 2 0 sub 3 or CaO. Reviewed in this paper are formulations and other melt conditions used successfully in batch tests to make glasses from actual and synthetic wastes; leachability and other properties of these glasses show them to be satisfactory vehicles for immobilization of the Hanford wastes.

Chian, Edward S.K. and DeWalle, Foppe B.
"Compilation of Methodology for Measuring Pollution
Parameters of Landfill Leachate". Cincinnati:
Municipal Environmental Research Lab, October 1975.
NTIS Accession No.: PB-248 102/6SL
EPA Accession No.: EPA 600/3-75-91

Different analytical methods can be used to determine a specific parameter, a preliminary laboratory evaluation was made of those methods least subject to interferences. All analyses were conducted with a relatively concentrated leachate sample obtained from a lysimeter filled with milled solid waste. The results indicate that strong interferences are sometimes encountered when using colorimetric tests due principally to the color and suspended solids present in leachate. In such instances alternative methods were evaluated or recommendations were made to reduce the interfering effects. Automated chemical analysis using colorimetric methods can sometimes experience significant interferences.

Duvall, D. S. and Hecht, S. C.
"Characterization and Utilization of Municipal and Utility Sludges and Ashes, Vol. IV Municipal Incinerator Residues". Cincinnati: National Environmental Research Center, May 1975
NTIS Accession No.: PB-244 313/3SL
EPA Accession No.: EPA 670/2-75-033d

The composition and current disposal practices for the residue resulting from the incineration of urban refuse have been studied. In addition, the characteristics of urban refuse are described, and the location and capacity of the nation's municipal incinerators specified. The economic and technical potential for utilizing materials recovered from the residue have also been studied.

Duvall, D. S. and Hecht, S. C.
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Ifeadi, C.; Krause, H. H.; Markle, R. A.; and Vaughan, D.A. "Environmental Assessment of Future Disposal Methods for Plastics in Municipal Solid Wastes". Cincinnati: National Environmental Research Center, June 1975.
NTIS Accession No.: PB-243 366/2SL
EPA Accession No.: EPA 670/2-75-058

Production of plastics for engineering and consumer items in the United States has been predicted to reach 113 million tons per year by the year 2000. This figure does not include the production of polymer used for synthetic fiber or fabric. From 31 to 38 million tons of the plastic produced is expected to reach the solid waste stream, depnding on the basis of estimation. The largest amount will go to sanitary landfills, and the next largest amount will be thermally treated using such methods as power generation. incineration, and nyrolysis. Small amounts of plastic are expected to be disposed of in open dumps or as litter. Resource recovery for plastics in municipal refuse up to the year 2000 is expected to be insignificant. Air pollution as a result of plastics in the landfills and open dumps will be negligible, even if there is still some burning of open dumps in 2000.

Senturue, Steven and Wilson, Dand
"Design Considerations for a Pilot Process for
Separating Municipal Refuse." Cambridge: Massachusetts
Institute of Technology, May 1975.
NTIS Accession No.: PB-242 136/0SL

Separating municipal solid waste into its valuable and recycleable elemental components is examined here in terms of various mechanical engineering schemes and processes that might best accomplish this task. Although past efforts have concentrated on first reducing the particle size by shredding, this investigation considered the advantages of whole-item coding and sorting without the expensive shredding operation. The result was an interesting base technology for a proposed pilot plant design that could potentially redirect future resource recovery efforts in solid waste.

Systems Technology Corporation. "A Technical, Environmental and Economic Evaluation of the Wet Processing System For The Recovery and Disposal of Municipal Solid Waste.
Washington: Environmental Protection Agency, 1975.
NTIS Accession No.: PB-245 674/7SL
EPA Accession No.: EPA 530/SW-109c

A technical, economic, and environmental evaluation is given for a wet pulping process used for the recovery and disposal of municipal solid waste. The demonstration facility consists of three major systems: hydrasposal, fibre recovery, and glass and aluminum recovery. This report presents the data for the hydrasposal and fibre recovery systems only.

2. AGRICULTURAL SOLID WASTE DISPOSAL

"Agricultural Waste Management Field Manual"
NTIS Accession No. PB-244 466/9SL Aug. 1975

The manual is intended primarily for use by SCS field personnel in planning and installing agricultural waste management systems. Major emphasis is on management of wastes from concentrated livestock operations although recycling or disposal of solid and liquid community wastes on agricultural land is also discussed. Characteristics of various wastes are covered as well as their effects on soils, plants water, fish, and wildlife. There is a chapter on planning complete livestock and poultry waste management systems and another chapter on design of system components including waste storage facilities, lagoons, settling facilities, holding ponds, waste irrigation systems and other conservation practices. Other chapters provide guidance in management of pesticides and other chemicals and in monitoring and sampling of water quality. Much of the data and information in this manual will also be useful to other individuals and organizations working in the field of agricultural pollution abatement.

Ferguson, Thomas L.; Lawless, Edward W.
"Guidelines for the Disposal of Small Quantities
of Unused Pesticides"
NTIS Accession No. PB-244 557/5SL June 1975

This study has compiled and organized information that will be useful to responsible authorities in advising the layman (particularly the homeowner and small farmer) how to dispose properly of small amounts of surplus and unwanted pesticides and pesticide containers, and in treating pesticide spills. The report brings together available information on pesticide disposal methods and on over 550 individual pesticides, and evaluates this information in terms of the experience and equipment that the average layman has. Fourteen pesticide disposal procedures are described and procedures for disposal of containers and cleanup and treatment of spills are included. Preferred and alternate disposal procedures are recommended for over 550 pesticides. The report includes a cross-index of over 1,600 pesticide names, tables showing the chemical composition and properties pertinent to disposal of the selected pesticides and bibliography of 166 references.

3. MINING SOLID WASTE DISPOSAL

Coalgate, J. L.
"Study of Coal-Associated Wastes Resulting From
the Mining Processing and Utilization of Coal"
S.D.C. Accession No. FE-1218-T-1 Aug. 1975

This bibliography provides a readily available review of information dealing with the utilization of wastes produced during the mining, preparation, combustion, gasification, and coking of coal. Such wastes could serve potentially as sources of fuels, building and construction materials, and of new materials for the metallurgical, chemical water treatment, and agricultural industries. Chapters are included concerned with acid mine drainage, utilization of coal mining refuse, coal refining and preparationwastes, shale, coal, coal dust and fines, coal ashes and coal slages, chars, coke breeze and coking wastes, and coal gasification. The published literature covered by the bibliography was produced in the period between 1900 and 1972. References were compiled from several sources, including Chemical abstracts, 1907 - 1972.

Kelsh, D. J.; Sprute, R. H.
"Limited Field Tests in Electrokinetic Densification of Mill Tailings"
NTIS Accession No. PB-243 652/5SL: June 1975

Extensive laboratory testing has shown that electrokinetic densification can be an effective method for dewatering and consolidating unclassified metal mine mill tailings. This report describes results of a limited field test of this technique. Eighteen-cubic-yard concrete model stopes., 18 feet long by 6 feet deep by 56 inches wide, were filled with unclassified tailings slurry from a metal mine in the Coeur d"Alene, Idaho, district. Five different tests were performed. They showed that a strong, dense, dewatered fill can be obtained in a reasonably short time using electrokinetics, with typical power consumption of 25 to 30 kilowatt-hours per cubic yard of densified fill. At present power costs in the Coeur d'Alene district, this would amount to 10 to 12 cents per cubic yard.

"Proceedings of Kentucky Coal Refuse Disposal and Utilization Seminar".
NTIS Accession No. PB-249 304/7SL Dec. 1975

This document contains the proceedings of the first Kentucky Coal Refuse Disposal and Utilization Seminar held at Southeast Community College in Cumberland, Kentucky, May 22, 1975. The Seminar was attended by 77 persons representing coal industry operators, mining and civil engineers, representatives of federal, state and local governmental agencies, local business leaders and college students. Topics discussed were: Recent European practice in coal refuse utilization; Utilization of Pennsylvania anthracite refuse; Utilization of coal mine waste for strata control; Water Quality aspects of coal refuse utilization; Characteristics of a good industrial site; Improving mining technology and its implications for local land use planning; Possibilities from the area development districts and local initiative standpoints; Local government involvement in coal refuse utilization, technical memorandum; Local problems and research needs for optimum disposal and utilization of coal refuse; The coal operator's participation in community development.

Sullivan, G. V.; Terichow, Oleg
"Electrophoretic and Filtration Studies of a
Florida Phosphate Slime"
NTIS Accession No. PB-242 621/1SL May 1975

The disposal of slimes generated in processing Florida phosphate rock is a persistent problem that has not yet been resolved. The settling of solids in ponds, however, requires a very long time, sometimes extending over a decade. Furthermore, the danger of dam failures with the resulting ecological damage is a real problem to the phosphate industry. This report contains results of a Bureau of Mines investigation of the optimum conditions for mutual coagulation and settling of phosphate slime with antracite addition based on alteration of physicochemical and electrokinetic properties. Electrophoretic mobility was altered by addition of aluminum sulfate, and settling character was determined by filtration.

"Underground Disposal of Coal Mine Wastes,
National Academy of Sciences - National Academy
of Engineering, Washington, D.C. Environmental
Studies Board"
NTIS Accession No. PB-245 130/OSL

The report assesses the technological and economic feasibility of underground refuse disposal in the context of the full resource problem, considering the subsequent effect on the underground mining environment, costs and benefits as compared to other health factors. Considerations include safety of miners, groundwater contamination, backfilling methods, and losses in productivity. Existing legislation for coal mine waste disposal is reviewed. Tables and figures augment the text.

III. A. MUNICIPAL LIQUID WASTES DISPOSAL

Cirello, John; Genetelli, Emil J.
"Gas and Leachate from Landfills: Formation, Collection and Treatment".
NTIS Accession No. PB-251 161/6SL March 1976

Contents: Introduction to symposium on gas and leachate from landfills; formation, collection and treatment; Current EPA research activities in solid waste management; Current office of solid waste management programs; landfill activities; Current solid waste research activities in New York State: Current solid waste management activites in Puerto Rico; Landfill research work in progress at Harwells Hazardous Materials Service; Theoretical approach to gas movement through soils; Analytical methodologies for leachate and gas analysis; Leachate attenuation in undisturbed and remoulded soils; Variations in gas and leachate production from baled and non-baled municipal refuse; Gas and leachate generation in various solid waste environments; Leachate migration through selected clays; Organic pollutants contributed to ground water by a landfill; Attenuation mechanisms of pollutants through soils; Monitoring toxic chemicals in land disposal sites; Assessing synthetic and admixed materials for lining landfills; Landfill management with leachate recycle and treatment; Solid waste degradation due to shredding and sludge addition; Case history of landfill gas movement through soils.

Carroll, Thomas E.' Maase, David L.
"Review of Landspreading of Liquid Municipal
Sewage Sludge".
NTIS Accession No. PB-245 271/2SL

The objective of this study was to review and summarize existing information regarding landspreading of liquid municipal sewage sludge. An extensive literature review was conducted and an annotated bibliography is available as a separate report from NTIS. Emphasis was also given to obtaining information concerning the number of sewage treatment plants currently using landspreading. A questionnaire survey of 1909 sewage treatment plants in Federal Regions 2, 3, 4, 5, and 9 was conducted and selected operations were visited. The information and data gathered during the study are summarized relative to sludge characteristics, sludge handling and distribution systems, economics of landspreading, sludge-soil-plant interactions, public health considerations, land acquisition, and survey of sewage treatment plants. The survey indicated that about 21 percent of the plants in the study regions are using landspreading routinely. Sixty-eight percent of the plants using landspreading have been conducting the practice for less than ten years. Of this 68 percent, over two-thirds have begun the practice only within the last five years.

Pohland, Frederick G.
"Sanitary Landfill Stabilization with Leachate
Recycle and Residual Treatment"
NTIS Accession No. PB-248 524/1SL Oct. 1975

Results of an experimental system for study of landfill disposal of approximately 0.3 cum of domestic refuse are provided. The study evaluated not only traditional landfill decomposition as represented by single pass of water originating from rainfall but also recirculation of the collected leachate. Sewage sludge addition to the solid waste and pH control of the recirculated leachate were also evaluated. Biological and physical-chemical methods for treatment of leachates, especially those derived from the stabilized solid waste undergoing leachate recirculation were also evaluated. Analysis of about three years of data indicated that leachate recirculation was very beneficial in accelerating the removal of at least the readily available organics from the refuse and leachate. This rate of removal, accomplished over a period of months for the recirculated units as compared to the traditional, single pass unit, was further enhanced by the initial addition of sewage sludge and by pH control. The leachate treatment studies indicated that either aerobic or anaerobic biological processes successfully remove leachate organics and that the effluent residuals could be polished by activated carbon adsorption and/or ion exchange either separately or in combination.

B. INDUSTRIAL LIQUID WASTE DISPOSAL

Offutt, Carolyn K.; Wastler, T.A.
"Disposal of Organochlorine Wastes by
Incineration at Sea"
NTIS Accession No. PB-246 243/OSL July 1975

The first officially sanctioned incident of ocean incineration in the United States occurred aboard the M/T Vulcanus in the Gulf of Mexico from October 1974 through January 1975 under an ocean dumping permit issued by the U.S. Environmental Protection Agency for ocean incineration of organochlorine wastes. The report describes the monitoring activities undertaken to evaluate ocean incineration as a disposal method. A total of 16,800 metric tons of waste were incinerated at a maximum rate of 25 metric tons per hour with a 1200C minimum and a 1350C average flame termperature. Stack gas emissions were mentioned for plume dispersion characteristics and to determine combustion efficiency. The findings indicate that more than 99.9 percent of the wastes were oxidized. Marine monitoring surveys indicate that there were no measurable increases in concentrations of trace metals and organochlorides in the water and marine life. Results of the project indicate that ocean incineration could be a viable alternative of waste disposal which should be considered along with other disposal methods including direct ocean disposal, land disposal, and land incineration.

Bergman, Fred J.; Ferguson, Thomas L.
"Determination of Incinerator Operating
Conditions Necessary for Safe Disposal of
Pesticides"
NTIS Accession No. PB-251 131/9SL Dec. 1975

This research program was initiated with the overall objective of determining design and operational criteria for incinerators that can effect complete thermal degradation of pesticides. An experimental incineration system was designed and constructed to evaluate the effect of operational variables (rate of pesticide injection, percent excess air, operating temperature, and retention time) on the efficiency with which organic pesticides can be incinerated. This system included a pilot-scale incinerator (45.4 kg/hr (10 (100 lb/hr) Type 1 waste capacity), a three-stage scrubber, and a scrubber water treatment system. Nine pesticiees in 15 liquid and solid formulations were tested by injection into the primary combustion chamber. The pesticides studied were DDT, aldrin, picloram, malathion, toxaphene, atrazine, captan, zineb, and mirex. Results of the incineration test were evaluated in terms of the efficiency of active ingredient destruction, i.e., the percent of the pesticide destroyed. A set of operating conditions (temperature, retention time, and excess air rate) was developed from comparable results for all 15 formulations which is believed to be applicable to the incineration of all organic pesticides.
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Lehmann, Edward J.; Werner, Kirk G.
"Waste Processing and Pollution in the Chemical
and Petrochemical Industries"
NTIS Accession No. NTIS/PS-75/541/3SL July 1975

This bibliography includes references discussing control processes, pollution effects, economic factors, emissions, and abatement strategies for the chemical and petrochemical industries. Air and water pollution and solid wastes are covered. (Contains 212 abstracts).

C. AGRICULTURAL LIQUID WASTES

Pence, D. T.; Shefcik, J.J.
"Waste Management Considerations in HTGN Recycle Operations"
S.D.C. Accession No. GA-A-13708

Waste management considerations in the recycle of HTGR fuel are different from those encountered in the recycle of LWR fuel. The types of waste associated with HTGR recycle operations are discussed, and treatment methods for some of the wastes are described.

Lapp, Thomas W.
"Study on Chemical Substances from Information
Concerning the Manufacture and Use of Selected
Alkyltin Compounds"
NTIS Accession No. PB-251 819/9SL Mar. 1976

The purposes of this study were to identify the production methods, importation, exportation, use patterns, and exposure to man and the environment for selected alkyltin compounds from 1965 to 1974. For this study, only organotin compounds having alkyl groups with eight carbon atoms or less attached to the tin were considered. Data for the production methods included the specific process, raw materials, annual production quantities, major manufacturers, waste products, environmental management of process wastes, and other production data. Use patterns were identified and annual consumption data were compiled for each compound in the respective areas of utilization. Major consumers in each use area were identified. Various possible methods for the exposure of man and the environment to alkyltin compounds were discussed and evaluated. Future production quantities and areas of usage were estimated for the next 10 years.

Appell, H. R.; Fu, Y. C.
"Conversion of Cellulosic Wastes to Oil Rept. of
Investigations 1971 - 73"
NTIS Accession No. PB-240 839/1SL Feb. 1975

The Bureau of Mines studied the conversion of a variety of cellulosic wastes for example, sawdust, bovine manure, sewage sludge, urban refuse (free of metal and ceramics), etc., to heavy oils. The reactions took place in the presence of synthesis gas and water or carbon monozide and water under conditions of elevated temperatures and pressures. Waste conversions above 90 percent, often near 99 percent, with oil yields in the range of 40 to 60 percent, were obtained in the temperature range of 250 to 425C and pressure range of 1,500 to 4,000 psig. Cobalt molydate on alumina catalyst, used with sodium carbonate, gave a product of lower viscosity and lower oxygen content than when using sodium carbonate as the sole catalyst.

Boisseau, H. J. Jr.
"Logistic and Economic Factors Affecting the Reclamation and Recycling of Waste Material and By-Products"
S.D.C. Accession No. AD-A023 605/9SL March 1976

The objective of this study is to design, test and implement a solid waste sampling plan for DoD installations which will generate usable information on solid waste generation, recovery and disposal by individual installations, commands, military services/DoD agencies and for the DoD as a whole. This interim report covers the first stage of the study. It primarily is concerned with the development and selection of alternative solid waste sampling plans for DoD installations. The scope is limited to acquiring data on the quantity, volume, (weight) composition and emission variables of the solid waste generated, recovered and disposed by the various activities of the installations.

Brand, B. G.
"Preparation of An Aqueous Emulsion Black top Dressing Composition Containing Tire Rubber"
NTIS Accession No. PB-245 718/2SL Feb. 1975

In the patent application, discarded used automobile tires are ground to powder form and incorporated into bitumens (asphalt or coal tar) by high-shear blending and controlled heating. The blended material is then emulsified to form a water suspension by high-speed stirring, using suitable dispersing chemicals, extenders, fillers, etc., to form a material suitable for use as black top dressing for treatment of driveways, parking lots, highways, etc. The tire rubber content of the resin portion (rubber + bitumen) preferably can vary from 5 to 25 percent.

Damron, B. L.; Jones, Richard H.; White, John T.
"Waste Citrus Activated Sludge as a Poultry Feed
Ingredient". Corvallis: National Environmental Research
Center, February 1975
NTIS Accession No. PB-240 672/6SL
EPA Accession No. EPA 660/2-75-001

The report presents an evaluation of the potential of using waste activated sludge as a poultry feed supplement. The sludge used in this study was obtained from an activated sludge process treating concentrated citrus waste containing no sanitary wastewater. The sludge was thickened, dewatered and dried using full-scale and pilot-scale equipment. The dried sludge was then analyzed for protein, fiber, amino acids, nutrients and moisture. Poultry feeds containing varying concentrations of sludge were prepared. Two experiements with broiler chicks, each of three weeks duration, one 8-week broiler study, and a six-month laying hen study were conducted to determine the effect of the inclusion of sludge in poultry diets on performance. It is shown in the report that the inclusion of sludge in properly formulated diets up to 7.5% did not significantly affect poultry performance or meat or egg quality. The value of the sludge was calculated based on the reduction in feed ingredients resulting from the inclusion of sludge. It was found that the value of the recovered sludge significantly reduced the total cost of sludge handling.

D. INSTITUTIONAL LIQUID WASTES

Combustion Power Company, Inc.
"Disposal of Air Force Liquid Wastes" April 1975
NTIS Accession No.: AD-A010 429/9SL
Air Force Weapons Lab No.: AFWL-TR-74-70

Presented are the results of a feasibility investigation on thermal degradation of selected USAF liquid wastes in a fluidized bed incineration system. Aircraft washrack wastes, paint stripping wastes, herbicide orange, petroleum, oil and lubricant wastes (POL), municipal garbage and sewage sludge were used for testing in Combustion Power Company's 3-foot diameter (LSW-500) fluid bed combustor. Results show that with proper liquid waste injection locations and procedures POL wastes or shredded and air classified municipal garbage can be used as fuel to dispose of non-fuel liquid wastes without requiring supplemental fuel. When using solid waste as fuel to dispose of liquid waste or when using limestone to control HCl an additional particulate emission control device downstream of the first and second stage inertial system will be required. Combustion Power Company is presently developing a dry scrubber for this purpose.

E. MINING LIQUID WASTES

Aamodt, Paul L.; Engler, Micheal R.; Madden, Preston;
and Stone, Ronald B.
"Evaluation of Hazardous Waste Emplacement in Mined
Openings" Cincinnati Municipal Environmental Research
Lab, December 1975
NTIS Accession No.: PB-250 701/GSL
EPA Accession No.: EPA 1600/2-75/040

This study assesses the technical feasibility of storing nonradioactive hazardous wastes in underground mined openings. The results show that a majority of the wastes considered can be stored underground in an environmentally acceptable manner if they are properly treated and containerized. Various mine environments in the United States are applicable for such storage; room and pillar mines in salt, potash, and gypsum appear to be the most favorable. Although the underground storage and management of hazardous waste is both technically feasible and environmentally sound, further and more detailed research, including an economic evaluation, is recommended.

F. SLUDGE

Holland, W. F.; Wilde, K. A.
"Environmental Effects of Trace Elements from Ponded Ash and Scrubber Sludge"
NTIS Accession No. PB-252 090/6SL. Sept. 1975

The disposal of solid wastes from coal-fired electric generating stations was investigated from the standpoint of trace element contamination of ground waters. Actual samples of ash and sludge from five operating generating stations were exposed to leaching conditions to simulate ponding. The levels of the dissolved trace elements were in general low, near the analytical detection limit. Selenium, chromium, boron, and in isolated instances, mercury and barium exceeded the proposed EPA Public Water Supply Guidelines. A series of batch and column tests using ash and sludge leachate in contact with natural soils was used to determine the degree of removal of trace elements in pond subsoil. Passage of pond effluent through soil was found to provide significant protection against ground-water contamination by trace elements.

Hill, Gregory A.; Lee, Gerhard B.
"Recycling of Compost in Dane, Green and Rock Counties,
Wisconsin by Application to Land"
NTIS Accession No. PB-247 111/8SL August 1975

Disposal of solid wastes has become a nationwide problem of increasing proportions during the last several decades. While growing concern for protection of the environment has resulted in improvements in the processing of solid wastes and their disposal, the basic problem of disposal still remains. This report is one part of an interdisciplinary study of solid waste disposal in the three-county area of Dane, Green, and Rock Counties, Wisconsin. The study focused on various alternatives for the utilization of wastes by recycling rather than disposal. Compost is seen to contain small but significant amounts of nutrient elements that are beneficial for plant growth. The suitability of individual tracts of land for recycling of compost is discussed. Passage of pond effluent through soil was found to provide significant protection against ground-water contamination by trace elements.

"An Environmental Survey of Effects of Dredging
and Spoil Disposal, London, Connecticut"
S.D.C. Accession No. AD-A015 647/1SL Aug. 1975

The report considers the activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground. Surveying of dredging impacts on suspended materials in the Thames River has been completed by UCONN. The data confirm earlier indications that effects are limited to within 150 m of the dredge. A model of the river's flow characteristics has been selected and is in the testing phase. (Three predredging surveys were conducted to determine baseline temperature, salinity, suspended solids and light transmission characteristics of the lower Thames River. These data were also used, in conjunction with historical information, to estimate predredging circulation of the lower river.) Mercury in river water was lower in February and April 1975 than during earlier periods, perhaps due to the removal by dredging of contaminated sediments. The report indicates large decreases, apparently due to natural seasonality, in benthic macrofaunal densities throughout the study area between predisposal and April 1975 collections. Predisposal water and sediment samples from 44 stations have been analyzed for fecal coliform and other bacteria. Highest fecal coliform counts were found in the river. Coliform counts were higher at disposal area stations on an ebb than on a flood tide, indicating that the Thames River outflow can have an effect on water quality within the designated disposal area.

Dick, B.I. "Attitudes in sludge treatment and disposal".
Journal of the Environmental Engineering Division
100(5) :1077-1087, Oct. 1974.
SWIRS Accession No. 031364

A review of sludge handling and disposal techniques is presented and the attitudes which direct present practices are discussed. Certainly there is the ever-present need to improve technologies for handling and disposal of sludge, however, there is also a great need to re-evaluate the basic approaches to the problem. It is necessary to avoid introducing materials into the sewers that are incompatible with efforts to reclaim sludge materials or with efforts to dispose of sludge in a suitable way. The effects of both waste water treatment practices on sludge disposal and of disposal practices on waste water treatment plants have sludge handling and disposal facilities. Regional collection and disposal schemes may prove to be both economically feasible and ecologically plausible methods of dealing with sludge. Often sludge treatment concentrates on removal of water. It is suggested that not only is this not necessary, it is economically wasteful.

Doyle, F. J., H. G. Bhatt, and J. R. Rapp
"Solid Wastes Handling and Disposal Costs". An
analysis of pollution control costs. Washington, D.C.,
U.S. Environmental Protection Agency, Office of Research
and Development, Feb. 1974. p. 385-399
SWIRS Accession No.: 032152

This section presents an evaluation of the estimated costs for solid waste management remedial programs in the Monongahela River Basin. Research indicates that containerization collection system is most suitable and economic for rural areas. The elimination of open dumping in the area can be expected to cost about 8,000 dollars per acre of dump site closed and sealed. The use of abandoned strip mines for sanitary landfills can provide an economic and environmentally advantageous solution to solid waste disposal in this region. Incinerators for municipal solid waste are estimated at about 4,000 dollars per ton of rated capacity. Operating costs for incinerators are highly variable, depending largely on the capacity and the percent of capacity use per day. The use of composting for solid waste disposal in the United States has not been attractive, due to the relatively high cost, estimated in a range of 6 to 8 dollars per ton, and the lack of market for the compost. Experimental solid waste disposal and recovery techniques include pyrolysis, biological fractionation, and recycling. The economic feasibility of these systems is not clear at this time.

Hopper, R. E. "A Nationwide Survey of Resource
Recovery Activities". Washington, D.C.
U.S. Environmental Protection Agency, Jan. 1975
SWIRS Accession No.: 035198

This compilation of State and local resource recovery projects was written for the Federal solid waste management programs. Activity reports for 44 cities and/or regional projects include the name and address of the project contact, the contact person at the U.S. Environmental Protection Agency, the type of project involved, the tons of waste processed per day by the facility, the capital cost, identification of the method of financing, the names of the contractors used for the project, and a brief description of the status of the project. Activity reports for each of 17 States report the development of State solid waste management and resource recovery plans, the creation of organizations to assist in solid waste management activities, and solid waste management grant and loan programs in the States. Summary data is presented on the status of the municipal resource recovery systems described and on the type of State involvement in resource recovery for the 17 States for which activity reports are included. A list of several communities which have systems for the recovery of ferrous metal only is included.

Sherwood, P.T.
"The Use of Waste and Low-Grade Materials in Road Constructions: 2 Colliery Shale"
NTIS Accession No. PB-243 740/8SL 1975

The use of lower-grade and waste materials as alternatives to naturally occurring aggregates in the construction of roads helps to conserve the supplies of good quality aggregates and assists in problems arising from the disposal of unwanted materials. This report is one of a series that is aimed at bringing together the information that is available on each of the major waste products that have roadmaking potential. It deals with colliery shale and it considers the extent to which shale can be used in road construction. The report discusses the types and quantity of shale that are available, the purposes to which it can be put in the various stages of road construction and the tests needed to ensure that shales meet the required specifications.

Rod, Delphine Joseph
"Reclamation Processes for the Recovery of
Precious Metals"
S.D.C. Accession No. AD-A009 184/3SL April 1975

The Fairchild-Hiller Model 1150 incinerator, the Calcinator 10-GSX incinerator and the Atlantic Film Industries' stripper were evaluated on their ability to destroy photographic film and recover silver. The points of evaluation were percentage of silver recovered, cost of operation, and the impact upon the environment. The Fairchild-Hiller Model 1150 recovered a high percentage of the silver available and met all pollution requirements for now and the foreseeable future. The Calcinator 10-GSX incinerator did not have as good a recovery rate as expected and needed additional equipment to meet air pollution standards. The Atlantic Film Industries' stripper recovered a high percentage of silver, but did not declassify the film base and required extensive manhours to operate.

Rigo, H. G.
"Use of Refuse as a Fuel at Fort Monmouth, N.J."
NTIS Accession No. AD-B003-456/SL April 1975

This report analyzes the feasibility of using refuse-derived fuel (RDF) in the school boiler plant at Fort Monmouth, N.J., and the desirability of modifying the Monmouth County shredder facility to produce RDF. The county can produce RDF by adding an air classifier to its existing shredding facility. Fort Monmouth can convert existing boilers to RDF firing by installing reciprocating grate stokers and a baghouse for air pollution control. The project is ecologically sound since renewable fuel resources would be used at Fort Monmouth. Design criteria for the boiler plant modifications are included. Capital and life-cycle cost estimates for both RDF production and use are presented.

Nelson, W. E.
"Solid Wastes, Animal Refuse, and Organic Residues
Disposal, and Quality of Ground Water"
NTIS Accession No. PB-244 826/4SL 1975

Studies on a field sanitary landfill, on laboratory sanitary landfills, and on an animal feedlot were conducted to correlate the design criteria, field desnity, temperature and subsidence patterns of the buried wastes, and the vegetative covers with the chemical and ground water pollutional characteristics of the leachates generated by the decomposing wastes. These data were interpreted in relation to the field densities of the compacted refuse, the vegetative covers, time, and the eventual chemical character of leachates and having passed through a prescribed distance of soil in a given time. The results indicate that there are no specific relationships between precipitation, time, and the volume of leachate drained from the lysimeters compacted to two levels of compaction. The leachates (pH 6.98 - 11.35) had high concentrations of the chemical constituents initially (at the initial soil - solid waste interface) but decreased as more leachate was generated. This, with the lowering of the pH (down to pH 6.0) indicates that the soil removes chemical pollutants from the permeating leachates.

Montagna, Dominic
"Fluxless Recovery of Metallic Aluminum from Wastes"
NTIS Accession No. PB-245 368/6SL May 1975

In the patent application aluminum metal is recovered from processing wastes, such as dross, beverage can scrap and the like, without use of a flux by heating the wastes to a temperature above the melting point of aluminum but below about 800C while maintaining the wastes under a protective gaseous atmosphere which is substantially inert to molten aluminum. After melting of aluminum contained in the wastes is complete, the heated material is agitated gently to agglomerate the molten aluminum and to cause its settling and collection in the bottom of the containment vessel. Molten aluminum is thereafter removed from the vessel leaving a substantially inert residue. Argon is preferred as the protective atmosphere.

Makar, H. V.
"Evaluation of Steel Made with Ferrous Fractions from Urban Refuse"
NTIS Accession No. PB-243 682/2SL June 1975

A two-part study was conducted to determine problems associated with the use of ferrous fractions from urban refuse as melting stock for steelmaking and to evaluate the resulting steel products. The first part of the study involved 50 lb. ingots from laboratory melts, and the second part included 50 and 800 lb ingots from 1-ton-electric-arc-furnace melts. The 50 lb. ingots from the laboratory melts and the arch furnace melts were hot rolled to provide material for mechanical and corrosion testing. Most steels rolled successfully and exhibited acceptable surface and edge condition; tensile strengths of the plain carbon steels were not significantly affected by copper, up to concentrations of 0.65 percent, and were not affected by tin contents; impact strength decreased with increasing tin content, and hardness increased slightly with increasing copper content; in general, properties of the steel produced were not measurably affected by charge composition (that is, melting stock), melting practice, or method of scrap preparation.

Liebman, Jon C.; Pfeffer, John T.
"Biological Conversion of Organic Refuse to Methane"
NTIS Accession No. PB-247 751/1SL Sept. 75

Urban solid wastes contain significant quantities of energy that can be reclaimed. Biological conversion of the organic refuse to methane by anaerobic fermentation is one mechanism by which this energy can be reclaimed. This report contains the results of an investigation of refuse fermentation at a thermophilic operating temperature of 60C. Results of dewatering of the fermentor residue by vacuum filtration is presented. Results by pretreatment of the refuse by a hot-caustic process are presented. Treatment requiarements for the centrate-filtrate produced by dewatering of the residue are presented. A mathematical simulator of the fermentation process, vacuum filtration process, shredding and separation process and residue disposal processes has been constructed. Results from the simulator runs are presented.

Kispert, R. G.; Sadek, S.E.
"Fuel Gas Production From Solid Waste"
NTIS Accession No. PB-245 083/1SL Jan. 1975

Six major program tasks are discussed: (1) Preliminary engineering analysis and economic evaluation of a full-scale fuel gas from solid waste facility; (2) Pilot plant design, procurement, and initial operation; (3) Supporting laboratory experiments and studies at the University of Massachusetts and M.I.T.; (4) Confirmation of the economic model for the full-scale fuel gas from solid waste facility; (5) Evaluation and specification of a proof-of-concept pilot plant; (6) Application of the computer model to full-scale plant studies.

Alter, H.; Reeves, W. R.
"Specifications for Materials Recovered from
Municipal Refuse"
NTIS Accession No. PB-242 540/3SL May 1975

Specifications presented in this report represent first efforts to define uniform qualities of materials separated from municipal solid waste in resource recovery processing plants for subsequent sale and use. The establishment of specifications adds value to outputs and promotes acceptance by users as a result of providing basis for quality assurance. Recoverable materials investigated in this study are: folded newsprint and corrugated paper, ferrous metals, aluminum, other nonferrous metals, glass cullet, inorganic fines, mixed organics (for fuel). Indications of possible contamination were obtained on a limited scale by reviewing literature, visiting plants, and coordinating with the activities of a companion research grant which included processing pilot quantities of municipal solid waste from several cities.

Henn, John J.
"Updated Cost Evaluation of a Metal and Mineral Recovery Process for Treating Municipal Incinerator Residues"

An economic evaluation was made of the Bureau of Mines incinerator residue separation process to update the one published in 1971 to a mid-1974 cost basis. This evaluation includes a modification of the glass recovery operation used in the original plant design as well as a unit to bale ferrous scrap product before shipment. Products from the plant are ferrous metal, aluminum and copper-zinc scrap, and a mixed color glass cullet. Capital and operating cost estimates are included for four plant sizes. A graph of interest rate of return as a function of total product value is included to provide a measure of the profitability of the process.

Graminski, Edmond L.
"Problems and Potentials in Paper Recycling"
NTIS Accession No. PB-248 083/8SL

The principal disincentives for paper recycling are: (1) the ready availability of virgin wood fibers, (2) lack of research on recycling of paper, (3) economics favor the use of virgin fibers, and (4) contaminants in waste paper present major problems in recycling. In spite of the large amount of waste paper that is available, a waste paper shortage occurred in 1973 and has continued into 1974 because of problems in collection, fluctuation of the waste paper market, and lack of manufacturing capacity. It is suggested that market pulp mills, located in or near large municipalities, be erected as needed to provide the need for more market pulp. This secondary pulp would be available to many mills that now are not equipped to process waste paper.

"Fuels from Municipal Refuse for Utilities: Technology Assessment"
NTIS Accession No. PB-242 413/3SL March 1975

This report presents the results of a study to survey the state of the technology in production of fuels from municipal solid wastes (MSW) for utilization by electric utility companies. The technology for energy recovery from municipal solid waste is under development. The sum of all known projects corresponds to a rather modest amount of power generation capacity, approximately 1/15 of those possible. The case of most interest is that of supplemental firing of prepared MSW fuel in a coal-fired boiler. It is not likely that solid fuels will be used in those boilers designed for only oil and/or gas. Decisions are required in the broad areas below and studies will be carried out to several levels of detail. These areas are: (1) MSW operations--existing and contemplated means of refuse removal and disposal, (2) technical aspects of both solid waste processing and utility operation, (3) legal and institutional aspects; (4) methods of financing projects, and (5) environmental aspects, which are particularly reflected in legal regulations, enforcement and public opinion.

Dressel, W. M.; Powell, H. E.
"Converting Stainless Steel Furance Flue Dusts and Wastes to a Recyclable Alloy"
NTIS Accession No. PB-243 628/5SL June 1975

Over 5 million pounds of nickel, and 90 thousand pounds of molybdenum are lost annually in the dusts generated in the production of stainless steels. Losses of these metals in the form of mill scale and grinding swarfs may be double the dust losses. This report describes a process for recovering these and other metals in the form of an alloy steel suitable for recycling. Zinc and lead, when present in the wastes, are recovered as byproducts in the form of oxide fumes. The laboratory scale process (10-to 25-pound charges) recovers up to 95 pct of the chromium, 100 pct of the nickel, and 100 pct of the iron as an alloy containing from 10 to 20 pct chromium, 6 to 12 pct nickel, and 55 to 65 pct iron together with lesser amounts of molybdenum and manganese, and essentially free of zinc, lead, and sulfur. The zinc-lead fume contains about 40 pct zinc and 20 pct lead and represents essentially all of these metals contained in the wastes.

Day, Delbert E.; Malisch, Ward R.
"Use of Domestic Waste Glass for Urban Paving"
NTIS Accession No. PB-242 536/1SL May 1975

This report summarizes research on the use of waste glass as an aggregate in asphaltic paving mixtures. Reusing waste glass in this manner would provide an outlet for large quantities of the glass and would permit recycling in urban areas where large accumulations of glass are found. Field tests as well as observations of pavement performance have indicated that field installations of asphaltic paving mixtures containing glass have generally maintained adequate skid resistance and performed acceptably from a structural standpoint. The economic feasibility of using waste glass as an aggregate in asphaltic concrete depends primarily on developing resource recovery systems that can separate glass along with other recyclable components and generate enough revenues from their sale, plus disposal and processing fees, to produce an acceptable return on equity.

Benham, C. B.; Diebold, J.
"Conversion of Solid Waste to Fuels"
S.D.C. Accession No. AD-A021 655/6SL

Economic and practical processes for recovering energy from solid waste were studied. Two promising fuels were identified - polymer gasoline and methanol. A nominal 10-pound-per-hour pyrolysis system was constructed and tested. Preliminary cost analyses and studies of the effects of population and energy market value on fuel costs were also conducted. (Author)

Socio-Economic and Intergovernmental Aspects of Residuals

Leung, Kenneth Ch'uan-K'ai
"The Environmental Control Industry. An Analysis of Conditions and Prospects for the Pollution Control Equipment Industry."
NTIS Accession No. PB-248 474/9SL Dec. 75

The report presents an evaluation of relevant macroeconomic and microeconomic data for environmental control equipment and analyses of emerging markets for these products and services, with primary emphasis on the pollution control industry. Direct dollar costs and benefits and the indirect costs of pollution and benefits of pollution control are discussed. The study provides perspective on the pollution control industry's significance in terms of environmental quality and of the national economy.

Mixon, W. R.; Rothenberg, J. H.
"Integrated Waste Management Systems: Onsite MIUS Applications"
S.D.C. Accession No. CONF-751216-1 1975

The Department of Housing and Urban Development (HUD) is conducting the Modular Integrated Utility System (MIUS) Program devoted to development and demonstration of the technical, economic, and institutional advantages of integrating the systems for providing all or several of the utility services for a community. Possible utility services include the provision of electric power, space heating and cooling, potable water, fire protection water, and liquid and solid waste treatment and disposal. The objective of the MIUS concept is to provide the desired utility services in a way that is consistent with reduction in the use of critical natural resources, protection of the environment, and minimization of cost. A MIUS might be sized to accommodate several hundred or a few thousand multifamily dwelling units, nearby single-family housing, and associated commercial facilities. It uses a complex of small, on-site combined package plants, each sized to meet demands of the development served. The MIUS is modular in that it can be installed near appropriate users in phase with the actual demands of community development or redevelopment. It uses an integrated systems approach whereby some resource requirements of one service are met by utilizing the effluent of another. For example, heat rejected from electrical generation might be used for residential space heating, and the effluent from liquid waste treatment might be used for fire protection and/or cooling tower water. Each of the maj

League of Women Voters Education Fund. Ways Leagues tried to involve their communities: closing dumps and upgrading sanitary landfills; local volunteer collection efforts. In Report of solid waste management study. Washington, D.C. 1973 p. 35-41.
SWIRS Accession No. 031144

This report by the League of Women Voters was prepared as part of an effort to help local Leagues develop citizen understanding of solid waste management problems, alternatives, and feasible options. In seeking better management of solid wastes, Leagues reported that they have been spending a great deal of time on working on the short term goals of closing dumps and upgrading landfills. Too often improvements in collection and disposal require overcoming local governmental obstacles. Enforcement of existing standards can be spurred by consistent citizen complaints. In other cases it is necessary to take steps to arouse public concern, such as the preparation of fact sheets and coverage in the local newspapers and television programs. Citizen groups such as the League can also conduct monitoring activities by paying regular visits to disposal sites to observe handling and processing practices. Violations of regulations can be reported to the proper authorities, with accompanying complaints and demands for action. Future problems can often be prevented by insisting on proper planning, adequate funding, and regional cooperation. While Leagues recognize that volunteer collection efforts will not provide a final solution for effective solid waste management, salvage activity can be a valuable way to stimulate public interest in waste recovery, build leadership groups for action on refuse issues, and prod public officials into imaginative solid waste planning.

Steiker, G. A framework for evaluating the economic effects of Regional Solid Waste Systems: Properties of the Model. "In Criteria for Regional Solid Waste Management Planning. Philadelphia, Pennsylvania, Regional Science Research Institute Dec. 1974. p. 32-55
SWIRS Accession No.: 034648

This report on the problems of regional solid waste management planning, which was prepared for the Office of Research and Development of the U.S. Environmental Protection Agency, is now available from the National Technical Information Service, Springfield, Virginia. This section describes the properties of a model for evaluating the economic effects of regional solid waste management systems. Formulas to be used in determining the induced effects of recycling on the economic system and which avoid the inclusion of unwanted intermediate demand effects due to the use of by-products in the recycling industries are illustrated and discussed. The economic repercussions of recycling in terms of such factors as decreased need for disposal services, increased industry in a given region, or decreased output from other industries are examined and equations to cover these exigencies are demonstrated. Formulas for evaluating the effects of recycling on the prices of products of the economic system are presented. Methods for simulating the effects of new recycling possibilities and disposal technologies on the economic system are also examined. (This document is retained in the SWIRS library.)

Miller, E. L.
"From Rags to Riches: An Overview of Solid Wastes Management and Energy Recovery"
S.D.C. Accession No. LA-UR-75-1590 April 75

An overview of recycling residential, industrial, and municipal wastes is presented and includes methods, systems, and market potential for the by-products. An economic analysis of resource recovery must be made to identify the capital investment, operating cost, and return on investment. Evaluations to date by EPA and others indicate that a minimum of 200-240 tons per day of refuse is required to justify a cost-effective energy recovery project. Over 40 communities are presently conducting feasibility studies. By 1980, 30 cities and counties plan to have 36 plants in operation processing 1,000 ton/day, a heat equivalency of 40,000 bbl/day oil equivalent. (One barrel of oil is equal to 5.8 million BTU.) The recovery efficiencies or inorganic material that can be recycled is between 67 to 75% for scrap aluminum, 90% for iron, and 70% for glass. It is concluded that if a maximum feasible level of resource recovery from residential and commercial waste were achieved in all major urban areas in the U.S., the equivalent would be the Nation's entire energy consumption for residential and commercial lighting, or more than half the direct oil imports from the Middle East in 1972, or almost one-third of the energy that will be delivered by the Alaskan pipeline. The recovery process also offers a reasonable alternative to the growing problems of landfill in municipalities.

Hostetler, Ralph B.
"Evaluation of Institutional Arrangements for Solid Waste Recycling"
NTIS Accession No. PB-247 234/8SL July 1975

This paper examines multiple criteria evaluative methods to assess institutional designs for large-scale solid waste recycling. Of the methods considered here several are from the literature, others have resulted from the work of the Institutional Arrangements Group of the Institute for Environmental Studies (IES) Recycling Project of the University of Wisconsin-Madison. Legislative developments preceding the establishment of the Wisconsin Solid Waste Recycling Authority (WSWRA) (Chapter 305, Laws of 1974) were studied. WSWRA's structure and powers were compared to those of the existing Connecticut Resources Recovery Authority (CRRA). Possible changes in current institutional design practices in the context of statewide recycling organizations were investigated.

Residual Waste Models

"A Model County-wide Collection and Disposal
System for Clark County, Arkansas"
NTIS Accession No. PB-243 029/6SL 1975

The purpose of this project was to establish a model county-wide rural collection system and sanitary landfill. For the most part, four-cubic-yard containers were used to provide collection service for rural and unincorporated areas. A sanitary landfill was established to serve the entire county. The final report describes the planning, design, implementation and cost of the county-operated collection and disposal operation and also provides a detailed account of a major dump closing.

Antonczyk, R.
"Interactive Program for Managing a Storage
for Radioactive Waste"
S.D.C. Accession No. KFK-2124   Mar 1975

Abstract: See NSA 32 05, number 12247

Franklin, William E.; Nuss, Gary R.
"Baseline Forecasts of Resource Recovery,
1972 to 1990"
NTIS Accession No. PB-245 924/6SL Mar. 1975

An assessment is made of the future of resource recovery from municipal waste for the years 1972 to 1990, based on the assumption there would be no Federal legislation to stimulate resource recovery to 1990. Key methods of recovery are examined with emphasis on large-scale system recovery techniques (primarily energy/material recovery by SMSA). Date on material collection, recycling centers and current scrap dealers are also included. The results are summarized by material for the resources studied: glass, ferrous metals, aluminum, plastics, rubber, paper.

Ghassemi, M.; Quinlivan, S.
"A Study of Selected Landfills Designed as
Pesticide Disposal Sites"
NTIS Accession No. PB-250 717/6SL Nov. 1975

This report presents the results of an in-depth study of historical, environmental, political, social, economic, and institutional aspects of selected landfills used for the disposal of pesticide waste. Information from the ten sites studied indicate that while there are similarities in certain features of the establishment and operation of some of the sites, the landfills also differ in a number of respects. The similarities and differences reflect the similarities and differences between applicable state regulations, local waste disposal needs, and cost factors. At the present time in many areas of the country there is a great need for the establishment of pesticide disposal sites or the development of alternative disposal methods. This report which presents the results is intended to serve as an information transfer publication, making available to pesticide disposal site planners and other interested parties the experience gained at the operating sites.

Shannon, L. J.
"St. Louis Refuse Processing Plant: Equipment, Facility and Environmental Evaluations"
NTIS Accession No. PB-243 634/3SL May 1975

The St. Louis Union Electric System is the first demonstration plant in the U.S. to process raw municipal waste for use as a supplementary fuel in power plant boilers. In addition to producing a fuel, ferrous metals are recovered from the waste for use as a scrap charge in steel production. Two separate facilities comprise the system--a processing plant operated by the City of St. Louis, and two identical boilers (tangentially fired), which were modified to fire shredded air classified refuse along with coal at the Union Electric Company's Meramec Plant near St. Louis. EPA contracted with MRI to conduct a test and evaluation program. This program includes equipment and facilities evaluations and environmental assessments at both the refuse processing plant operated by the City of St. Louis and the refuse firing facility operated by Union Electric Company's Meramec Plant. This interim report presents (a) test methodology, (b) equipment and facilities evaluation, and (c) environmental evaluations.

Smith, Mona F.
"Regional and Urban Solid Waste Disposal. Part 1
Management Planning"
NTIS Accession No. NTIS/PS-76/0301/2SL

Management, state, and local government policies, legislation, financing, data acquisition and general planning studies for urban and regional solid waste disposal systems are covered. The topics include comments on public health, landfills, pollution, recycling and load use. (Contains 132 abstracts, 51 of which are new entries to the previous edition.)

Smith, Mona F.
"Regional and Urban Solid Waste Disposal. Part 2
Local Case Studies (A Bibliography with abstracts)"
NTIS Accession No. NTIS/PS-76/0302/OSL April 1976

Case studies are cited on municipal waste disposal in specific cities, counties or regions. These studies include all aspects of collection, hauling, incineration, sanitary stations as applied to a specific locale. Management studies designed only for these areas are also included. (This updated bibliography contains 128 abstracts. 18 of which are new entries to the previous edition.)

Regional Planning

Stadelmaier, R. A. The regional reclamation and disposal facility approach to handling physical-chemical wastewater treatment sludges. "In Proceedings; National Conference on Management and Disposal of Residues from the Treatment of Industrial Wastewaters, Washington, D.C., Feb. 3-5, 1975. Rockville, Maryland, Information Transfer, Inc. p. 209-213.
SWIRS Accession No: 033980

This paper discusses the use of regional reclamation and disposal facilities to provide industry with a centralized pollution abatement service organization capable of recovering and disposing of waste materials. The Chem-Trol Liquid Waste Division of SCA Services, Inc., operates one such facility in Model City, New York. The operational philosophy of the regional facility emphasizes the extraction of values from waste materials whenever possible, complete chemical control, and maximum operational flexibility. In addition, an emphasis is placed on compliance with environmental codes, management of the operations to minimize future liability, active engagement in research and development, and production of an operational profit. Although it is generally not economically feasible to transport large quantities of wastes to a regional facility or to transport wastes a long distance for treatment, it is often economically advantageous to transport sludges by on-site water pollution control systems to such a facility for treatment and disposal. In addition, sludges are generated at the facility through treatment of industrial waste waters. Waste water treatment and industrial sludge pretreatment is designed to produce end sludges having contained contaminant immobility which are deposited in an environmentally controlled sanitary landfill. (This document is retained in the SWIRS library.)

Proceedings; National Conference on Municipal Sludge Management, Pittsburgh, Pennsylvania, June 11-13, 1974. Washington, D.C. Information Transfer, Inc. 218 p.
SWIRS Accession No.: 034043

This publication contains papers presented to the 1974 National Conference on Municipal Sludge Management. The papers present information on sludge handling, treatment, and disposal. Sludge dewatering, incineration, composition, and application to land are examined by several participants in the conference. Other papers discuss the use of particular processes such as anaerobic digestion, aerobic digestion, pressure filtration, the use of sludge for land reclamation, ocean disposal, and trenching at various municipal or regional sewage sludge treatment facilities. A number of demonstration projects are described in depth. The economics of various methods of sludge disposal are examined. Participants included representatives of Federal and local governmental agencies, private industry; and educational and research organizations. About 30 papers are included. (This document is retained in the SWIRS library.)

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